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Report of the Department of Health of the City of Chicago

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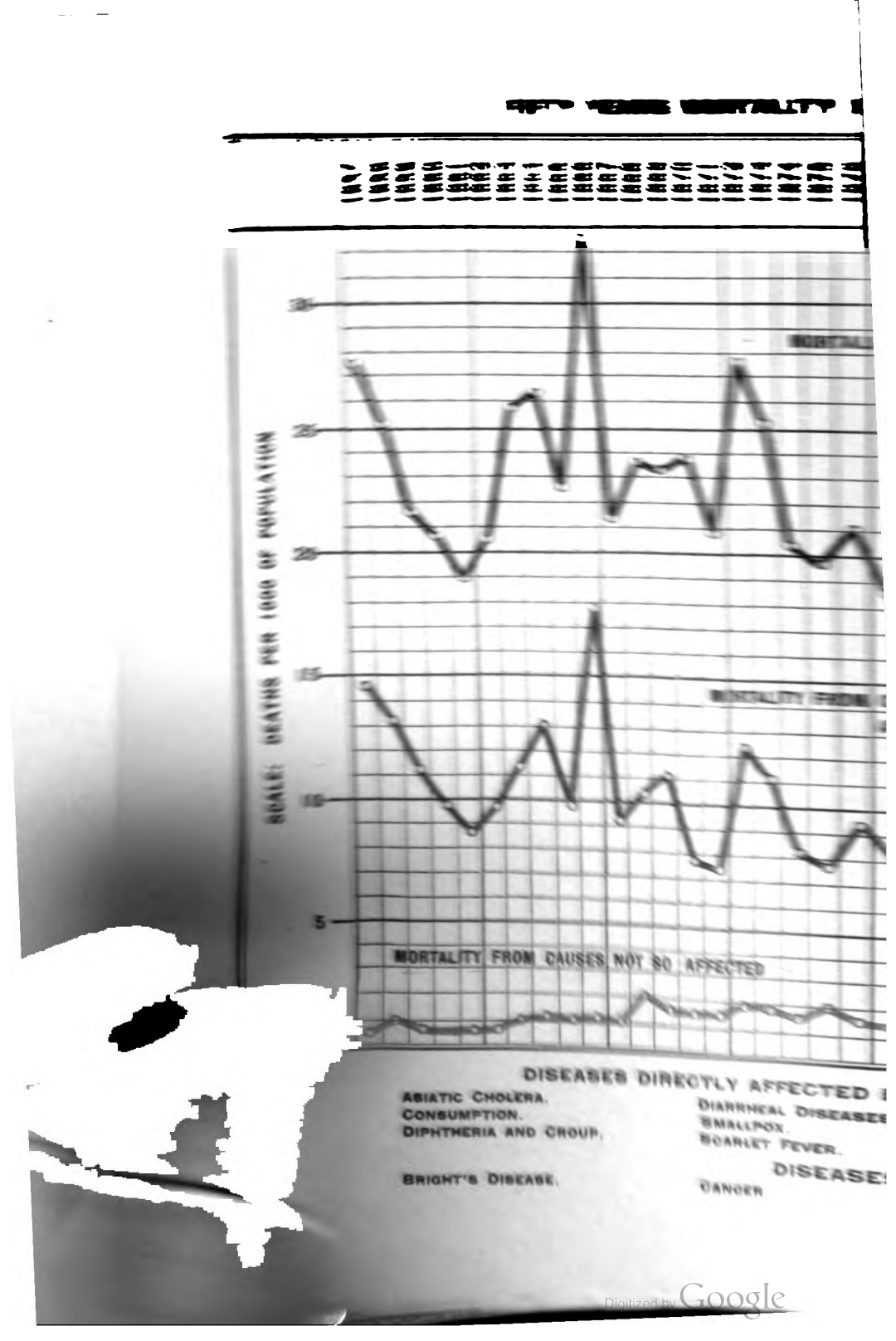

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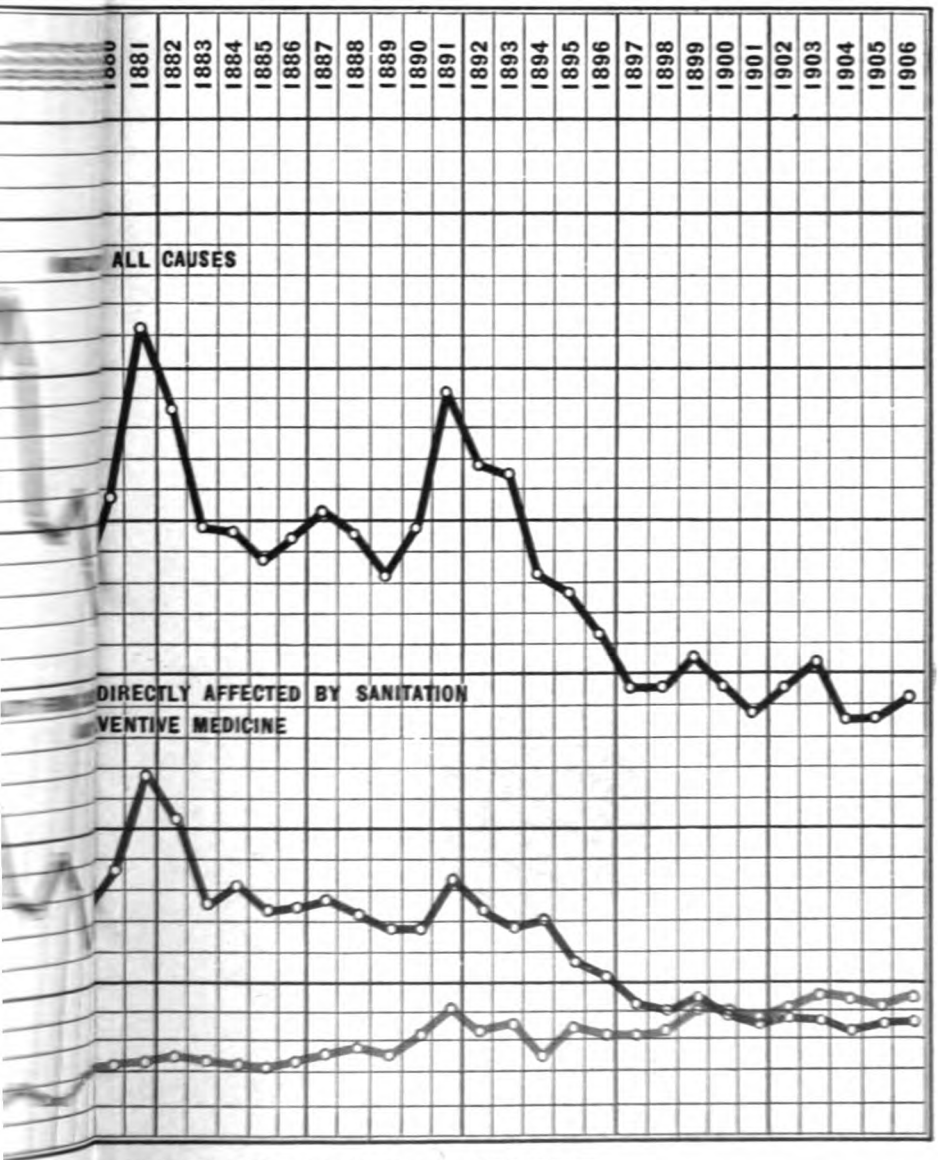

NITATION AND PREVENTIVE MEDICINE.

MALARIA.
WHOOPING COUGH.
MEASLES.
TYPHOID FEVER.
TYPHUS FEVER.

SES NOT SO AFFECTED.

HEART DISEASE.
PNEUMONIA.

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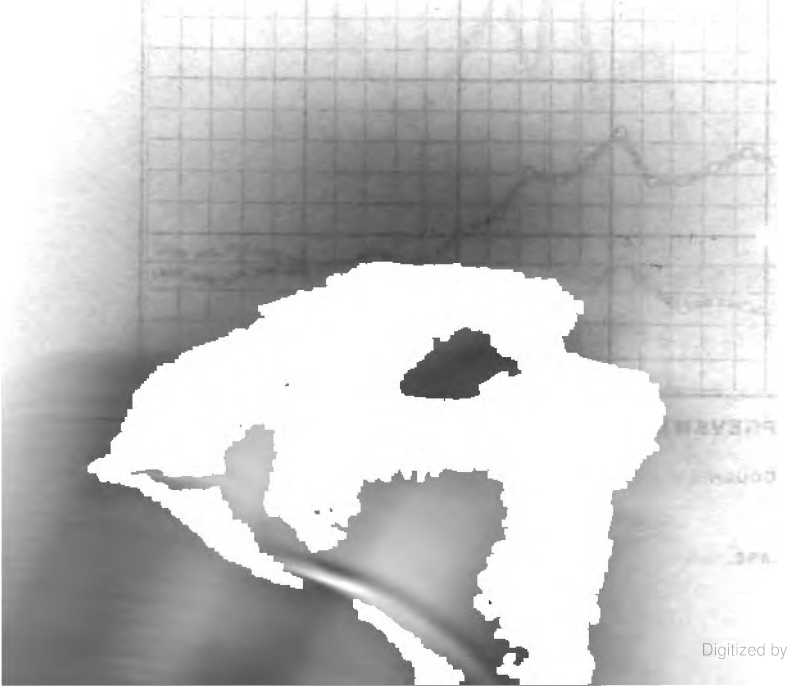

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ANNUAL REPORT

OF THE

Department of Health

OF THE

CITY OF CHICAGO

FOR THE

Year 1906

CHAS. J. WHALEN, M. D.
COMMISSIONER OF HEALTH

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Summary Report

OF THE

Commissioner of Health

FOR THE YEAR 1906

CHAS. J. WHALEN, M. D.

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DEPARTMENT OF HEALTH

CITY OF CHICAGO.

OFFICE OF THE COMMISSIONER,

CITY HALL, CHICAGO, 1907.

To His Honor, THE MAYOR, *and the*
Honorable, THE CITY COUNCIL, *of Chicago:*

GENTLEMEN: The administration of the Chicago HEALTH DEPARTMENT during 1906 has recently been characterized as the "most efficient and the most aggressive in its history."

Instead of working, as heretofore, along lines of least resistance—because of meager appropriations and skeleton forces—the persistent appeals of the Commissioner to the City Council have secured increases, both of workers and of means, more nearly adequate to the responsibilities devolved upon this branch of the City administration in safeguarding the life and health of the citizens. Some of the results may be briefly summarized as follows:

An increase of the food inspection forces has made possible the condemnation and destruction of more than 10 000 000 pounds of unfit and unwholesome foodstuffs, as compared with less than 4 000 000 pounds in 1905—which was then a larger amount than in any previous year.

At the average retail price before condemnation this implies that Chicago housekeepers have been saved from paying out more than $1 000 000 for unwholesome and poisonous foods—a saving that has even a greater value than the sum in dollars and cents in the prevention of sickness and premature death.

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Despite the failure to enact the Commissioner's proposed ordinance for the inspection and regulation of the cold storage industry, inspections have been made under the authority conferred upon the HEALTH DEPARTMENT by general ordinance provisions, and nearly 1 000 000 pounds of spoiled poultry and other unfit foodstuffs found in these houses have been condemned and destroyed, while a still larger quantity has been shipped out of the city rather than submit to inspection.

Sanitary Inspection.

In this connection it should be noted that among the important new features of work done by the Bureau of Sanitary Inspection during the year was the thorough inspection and correction of insanitary conditions found to exist at the Union stockyards, in the packing-house and food-producing plants of that vicinity. This work had been begun by the DEPARTMENT and was already well under way before the publication of the McNeil-Reynolds report.

Sweeping sanitary reforms were inaugurated in this district, and the conditions surrounding the preparation and handling of foodstuffs and pertaining to the habits and health of the employes, have been vastly improved.

Sanitary conditions of the public school buildings, police stations, workshops, the "Ghetto" district and the City Hall have also been the subject of frequent inspection and many defects of ventilation, plumbing, lighting, etc., have been corrected.

Milk and Dairy Inspection.

Additional milk and dairy inspectors have increased the number of milk and cream examinations from less than

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25 800 last year to more than 50 000 this year, and of dairy inspections from 3146 to nearly 4000.

Every dairy shipping milk to Chicago is now inspected twice a month. All milk from dairies that do not pass inspection—as to sanitary conditions, health of herds, methods of feeding, milking and handling—is excluded from the Chicago market until subsequent inspection shows remedy of defects.

This dairy inspection is supplemented by the Laboratory examinations of all milk offered for sale in the city.

The income from the work in the Milk Division, in licenses and penalties, has increased from $57 305 in 1905 to upward of $75 000 this year.

Sanitation of Restaurants.

For the first time in the history of the city the restaurant business has been put under sanitary supervision. Upward of 1500 places have been inspected for license; forty have been refused licenses and closed up, and 129 keepers have been prosecuted—both classes for insanitary conditions of premises or uncleanly methods of food preparation or for having unfit food in their possession.

From all these efforts to improve the food supply and its handling it results that the Chicago citizen was never before so wholesomely and nutritiously fed, nor in such a cleanly fashion.

The Commissioner has not waited for any Pure Food Law or for the enactment and enforcement of National or State legislation, but has utilized existing resources and authority more fully than ever before.

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Work of the Laboratories.

The activities of the Laboratories have increased nearly 30 per cent; and the Director reports a steadily growing recourse by physicians to their facilities. Useful improvement in methods is also reported. Among these is one for the prompt detection of boracic acid as an injurious preservative of milk and cream; another for greater accuracy in the bacterial diagnosis of typhoid fever; and still another for the speedier determination of the sanitary quality of the public water supply.

This supply from the City pumping stations has been uniformly good throughout the year, and the private supply to Rogers Park, which had been the cause of frequent complaint, has been made equal to the public supply by connecting its mains with the Lake View system.

The Ambulance Service.

By an ordinance passed November 26, at the instigation of the Commissioner, the City Ambulance Service, heretofore in charge of the Department of Police, is transferred to the HEALTH DEPARTMENT, and two medical officers are now attached to each of the fourteen ambulances—one for day and one for night service.

As argued before the Council Committee: "This change of jurisdiction is in the direction of greater efficiency in the City's Ambulance Service, for there will no longer be danger of serious errors in judging the degree or character of illness of a person picked up on the streets, as has been the case heretofore. It will also mean more promptness in 'first aid,' greater skill in handling accident cases and the possibility

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of preventing complications by beginning treatment of an injured person even before arrival at the hospital."

Improvements of Records.

The Commissioner wishes to call attention to the fact that the tables of Vital Statistics of the City—the "Chronological Summary of Principal Causes of Mortality in the City of Chicago for Fifty Years"—have been revised and the causes of death distributed in accordance with modern classification and nomenclature, thus adding greatly to the value of this feature of the work.

This revision has been made possible only by the installation of computing machines and other modern apparatus and methods, without which the limited clerical force could not have accomplished the results.

Card-index systems have also been introduced into all Bureaus and Divisions, by which records are made permanent, readily accessible and their value greatly enhanced.

The City's Health.

The general health of the City has been fairly satisfactory notwithstanding the unusual meteorologic conditions of the year—one of the driest and one of the hottest recorded in thirty-five years.

There has been no serious spread of any epidemic disease; no death from smallpox, for the first time in eight years; only a slight increase of the typhoid fever rate—now among the lowest of any large city; the consumption rate has decreased, while the deaths of children between one and five years of age—the "milk feeding period"—is the lowest of any large city—from diphtheria and scarlet fever especially.

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Only the communicable diseases of childhood have given serious concern to the DEPARTMENT. Their spread is attributed largely to the abandonment of medical school inspection, and an appeal has been made to the City Council for the employment of a sufficient number of inspectors to resume this most important service.

The total 29 048 deaths from all causes reported during the year to the Bureau of Vital Statistics represent a rate of 14.18 per thousand of the minimum estimate of 2 049 185 midyear population. While this is 3.9 per cent higher than the average rate of the previous two years it is 3.6 per cent lower than the average of the decade 1896–1905 and sufficiently low to again sustain our oft-repeated contention that Chicago is the healthiest of American cities that have a population of 300 000 or over—a fact that is graphically set forth by the appended diagram, in which the figures of population are those of the United States Census Bureau, and the deaths are as reported by the representative health authorities :

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MORTALITY RATES IN 1906 OF PRINCIPAL AMERICAN CITIES.

ALL THOSE HAVING POPULATIONS OF MORE THAN 300 000.

Chicago .....
Population, 2 049 185. Deaths, 29 048. Rate per 1000: 14.18.

Milwaukee ....
Population, 317 903. Deaths, 4 632. Rate per 1000: 14.57.

St. Louis.....
Population, 649 320. Deaths, 9 920. Rate per 1000: 15.28.

Cleveland .....
Population, 460 327. Deaths, 7 353. Rate per 1000: 15.97.

Buffalo .....
Population, 381 819. Deaths, 6 138. Rate per 1000: 16.08.

Detroit .....
Population, 353 535. Deaths, 6 542. Rate per 1000: 18.50.

New York.....
Population, 4 113 043. Deaths, 76 203. Rate per 1000: 18.53.

Boston.....
Population, 602 278. Deaths, 11 411. Rate per 1000: 18.95.

Philadelphia...
Population, 1 441 735. Deaths, 27 372. Rate per 1000: 18.99.

Baltimore.....
Population, 553 669. Deaths, 10 753. Rate per 1000: 19.42.

Pittsburg.....
Population, 375 082. Deaths, 7 314. Rate per 1000: 19.50.

Washington...
Population, 307 716. Deaths, 6 316. Rate per 1000: 20.53.

Cincinnati....
Population, 345 230. Deaths, 7 195. Rate per 1000: 20.84.

New Orleans..
Population, 314 146. Deaths, 6 819. Rate per 1000: 21.71.

Respectfully submitted:

CHARLES J. WHALEN, M. D.
Commissioner of Health.

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INFLUENCE OF SANITARY MEASURES ON MORTALITY.

ADDRESS DELIVERED BEFORE THE LEAGUE OF AMERICAN MUNICIPALITIES IN CHICAGO, SEPTEMBER 26, 1906.

BY CHARLES J. WHALEN, M. D.
COMMISSIONER OF HEALTH, CITY OF CHICAGO.

HYGIENE is the whole science and art of the conservation and promotion of health, both of individuals and of communities. It has for its function the prevention of premature death and the promotion of normal life, health and happiness both directly and indirectly by conservation and reinforcement of organisms and groups of organisms, and indirectly by elimination or amelioration of unfavorable environmental conditions both local and general. The field of hygiene is immense, for it includes not only all of sanitary science and the sanitary arts, but a large part of physiology as well as biology. It includes not only questions of water supply, milk supply, and sewerage, but also much of climatology, foods and feeding, clothing, heating, lighting, ventilation, vaccination, scavenging, the personal care of the body, work and overwork, sleep, rest, fatigue, exercise, play, sports, noise, crowding and overcrowding, and other subjects too numerous to mention, but comprised in part under the heads of public hygiene and personal hygiene, municipal sanitation, school sanitation, household sanitation, offensive trades, unwholesome or dangerous trades, toxicology and quarantine.

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Health and Disease.

Life has been defined as the continuous adjustment of internal to external relations and health might be defined on these terms as a normal state and performance of this adjustment. Disease would then be some serious disturbance or grave departure from this normal state and might conceivably be due to first, a failure of the intrinsic powers of adjustment, or second, some external conditions so severe or unusual that the normal adjustment was impossible, or, third, a combination of these factors.

A little reflection will show that to avoid disease and to forestall its effect, there are required first: mechanisms as capable as possible of adjustment to external relations, unfavorable as well as favorable; second, environment (external relations) to which the mechanism may readily adjust itself or making as small demands as possible upon its powers of adjustment. Of these two factors the former is at present the less under our control. The mechanism may indeed as a rule be strengthened by good air, good food, rest and other favorable conditions. It may be weakened by bad air, bad food, fatigue and other unfavorable conditions so that it shall adjust more or less successfully its internal to any external relations.

External Influences.

In actual life all these various conditions are readily observed. We find some persons so robust, that is to say, with mechanisms so capable of adjustment to external relations of whatever kind, that nothing seems to daunt them. They work hard, eat poor food, live in bad air, and seemingly disobey all rules of hygienic living, and yet possess apparently perfect health. Conversely, others surrounded by every sanitary contrivance, well fed, well housed and

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tenderly cared for, sicken and die in an environment apparently the most favorable, and finally in the same community are many who thrive as long as their external relations are good and easily dealt with, but who suffer just as soon as these become difficult to deal with. A period of unusual severity of climate, change of temperature, infection, financial or political buoyancy or depression, may promote or reduce from one rank to another with the consequence not only of numerous changes in actual sanitary conditions in individuals, but even of extensive improvement or deterioration in the average public health of a community. Of this a good example is an effective change in external relations, such as a financial panic causing anxiety, loss of employment, increased exposure, poorer feeding, loss of sleep, etc., but perhaps the best example is one in which a novel and direct action proceeds from the environment, unknown it may be until its work is done. Such a profound change in the external relations in the entire community occurs when some unsuspected epidemic falls upon an entire city or town. There are on record many cases of this kind, as for example, an epidemic of Asiatic cholera traced to a polluted and infected well; an epidemic of Asiatic cholera in London in 1866, traced to an infected public service water supply; an epidemic of typhoid fever in Lausanne (Switzerland), traced to an infected public ground water supply; an epidemic of typhoid fever in Caterham (England), traced to a polluted ground water supply; an epidemic of typhoid fever in Plymouth (Pennsylvania), traced to a polluted surface water supply; typhoid fever in Lowell, Lawrence and other cities on the Merrimac river; an epidemic of Asiatic cholera in Hamburg (Germany), traced to an infected surface water supply. It is seen, therefore, if a public water supply becomes contaminated with the germs of an infectious disease, as for example

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typhoid fever, the general standard of health in the community using it will be lowered.

It is true that abounding health is often exhibited by those dwelling in most unwholesome places, and that many who never bathe outlive many who do, but this does not mean that sanitary dwellings are superfluous or that bathing is a waste of time. Nothing is plainer in sanitary science, as in human experience, than that cleanliness is next to Godliness, and that on the whole the first external condition of health is cleanliness. On looking closely we shall find that the cases observed are exceptional or that the persons in question are the strong survivors of many now dead; among whom they represent the survival of the fittest. Although the surviving younger men of the family may seem hale and hearty, the elders while still young in years show the effects of the struggle for existence and often break down or succumb to disease before their natural time.

Darwin somewhere refers in sorrow to those persons who have failed to understand him, because they were utterly unable to appreciate the accumulative effects of small changes acting over long periods of time. The sanitarian needs constantly to be warned against the neglect of small and seemingly insignificant factors of disease in the form of unfavorable conditions which by their prolonged action and cumulative effects may produce great results.

The period of life may be divided into a period of youth, adult life, and old age. Only very rarely does the mechanism last longer than a century. Usually long before this it has stopped in death, which may have marked the end of life at birth or even long before it; in infancy, in childhood, in maturity or in old age. The period of growth and the period of decline, infancy and old age, appear to be the periods when death is least successfully resisted. In this last respect the two extremes of life resemble one another.

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The freshly lighted taper and that which is burned down to the socket are both easily extinguished by the slightest puff of wind.

Disease and Old Age.

Life is the period of activity of the vital mechanism; death marks the final stoppage of that machinery. Life is a perpetual struggle of the organism with its environment; death marks its final and unconditional surrender. Doubtless the principal cause of death should be old age; the natural maturity of the organism, the gradual and irreparable wearing out of the vital machinery; yet if we turn to any work on vital statistics, Chicago for instance, we find far more prominence given to other factors of mortality. There occurred in Chicago in 1905, 27 212 deaths; and in the enumeration of the causes in the registration report, there are laid down three classes of causes, namely:

1, death from disease, 92%; 2, violence, 7%; 3, ill-defined or unknown cause of death, 1%.

If we look for old age we find it under class three of which it constitutes three-fifths, or only three-fifths of one per cent of all deaths.

From the previous paragraph it is clear that disease is the cause of death most often assigned by physicians in filling out their death certificates; while old age, which may be considered the most natural cause, is comparatively rare. But this is much more apparent than real, since it often happens that disease would have been powerless to cause death if the vital machinery had not already been weakened by age. To what extent death is really due to age, it is, and always will be, impossible to say. The truth appears to be that many deaths occur under and are attributed to disease, which would not have been able to cause death had the victim been either older or younger; while

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... the other and death would not have occurred when it ... because ...

The cause of death may be classed as intrinsic from causes acting within the body proper or extrinsic causes acting outside the body or acting upon it from without. The former includes contracting disease the latter includes the cessation or obstruction of the vital mechanism, and the agent may be external mechanical influences acting upon it.

Diseases Amenable to Sanitation.

The human body is sensitive to external conditions, and it is now believed that many diseases originate exclusively from unfavorable environmental influences. Diseases which arise from some invasion of an organism may possibly be warded off. As they usually proceed from the environment and may be prevented, with such disease the sanitary science of today is chiefly concerned. The great reduction in mortality from yellow fever, bubonic plague, the practical elimination of typhoid fever and leprosy in many countries, the promising outlook as to the extermination of malaria, typhoid and epidemic dysentery, the reduction of mortality from diphtheria and scarlet fever, the reduction, in fact the practical stamping out, of smallpox in many civilized countries, leaves us no question but that sanitary science has already won signal victories, and that additional laurels will be won in the near future.

While it has been shown that disease is the principal agent of death, we must also bear in mind that disease is often facilitated in its work by age or enfeeblement which gives it a foothold and incapacitates the organism for resisting its activity. Physicians recognize differences of condition in which the bodies seem to possess great or only small powers of resistance or endurance. In this way it often

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happens that a low condition of vitality is generally believed to increase enormously the susceptibility to attacks of tuberculosis, diphtheria, scarlet fever, typhoid fever, etc., and soldiers enfeebled by long marches or bad feeding appear to suffer unduly from certain camp diseases. A little reflection will show that death as a rule comes prematurely. Old age, the only theoretically normal and natural cause of death is very rarely the one and only cause. Poor timber or poor materials or poor construction of living machinery alone, or together, making up a poor constitution, or else violence, poison, parasites or other unfavorable elements in the environment, usually bring on disease and death long before the appointed three score years and ten. Many die before they are born, more before one year of life is over; others under five, ten or twenty; some live on for thirty, forty or fifty years; but for the great majority death comes before old age. All this means that death is often premature and the principal function of sanitation and of the application of hygiene in general is the prevention of premature death.

Ventilation.

In order to get a clear conception of the way external forces acting over long periods of time affect the health, we will consider the subject of bad air or poor ventilation.

Air fills the soil to a depth of from fifteen to thirty feet, and makes up almost one-third of its volume. This subterranean atmosphere which exists in soil is in continual movement. This is mainly due to variations in the temperature of the earth and of the atmosphere which do not usually occur simultaneously, the variations of earth temperature for the most part following on similar variations in the temperature of the air, it being extremely rare for both earth and air to show the same temperature, at least

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for more than a very short time. The air is continually moving, either passing from the deeper to the more superficial portions of the soil or vice versa. Naturally the greatest range of movement will occur when the soil and air differ most in temperature. In autumn and winter the soil is the warmer and therefore the air present in it escapes into the atmosphere, the cooler atmospheric air entering into the pores of the soil.

In spring and summer, on the contrary, the ground air is cooler and denser than the atmosphere; hence it will tend to pass down into the deeper layers of the soil. On a cool day following a hot one the ground air escapes into the atmosphere, while on warm days it remains stagnant in the soil. At night, too, the warmer ground air will escape into the atmosphere. Beneath buildings such movements of the ground air may be very active, particularly in the case of houses that are artificially warmed, the air which passes up from below being often drawn from considerable depths, especially in the case of houses built upon "made soil." Air can, even if it moves slowly, rise therefrom in the course of a single night so as to constitute, with its moist, foul gases, a considerable portion of the atmosphere of our dwellings, courts and streets.

Contamination.

Much sickness may result from the aspiration of the foul air from the impure soil beneath. The chimneys and fires in the dwelling exercise to a certain extent a process of suction on the ground immediately beneath the dwelling and a quantity of the ground air with all its impurities may easily be drawn into it. Nor is this by any means a mere theory. Instances are on record of ordinary coal gas having been thus drawn a considerable distance beneath the frozen surface of the ground from a leak in the gas main, under a road, to the interior of a neighboring dwelling house.

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Similarly, leaking cesspools and drains may contaminate the soil the air from which, passing up into houses, may most injuriously affect the health of the inhabitants.

The permeability of the soil, its composition and that of the ground air, the amount of heat and moisture present and the variations in level of the subsoil water, have been found by numerous observers to bear important relations to many of the diseases which afflict mankind, while the lower animals are also, though perhaps to a less degree, liable to suffer from like causes.

Oxygen and Carbon Dioxid.

Coincident with the disappearance of oxygen from the ground atmosphere, an equivalent amount of carbon dioxide is produced, which, when the pressure of the air above ground is increased, or where the temperature is lowered, penetrates the soil. This drives out before it the ground air, which may thus enter the alleys and basements of houses from which it will probably ascend through the influence of convection to the upper stories. A similar effect has been shown to occur in consequence of heavy rains, the water filling up the interstices of the soil near the surface and so forcing down the gases in the soil, which will then escape at places where the ground is dry, as under buildings, this effect being more likely to happen the greater the porosity of the soil.

Many basement dwellings extend from three to ten feet below the surface of the ground. At a depth of thirteen feet the amount of oxygen present in the air entering them from below may be only from one-third to one-half the normal percentage, while the carbon dioxide is increased inversely as the amount of oxygen present. Accordingly it is evident that the danger incurred by the inhabitants of

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such dwellings may be very much the reverse of imaginary, particularly if the soil be much polluted with organic matter. This will be the more readily appreciated when we remember that the soil, and so the ground air also, teems with micro-organisms of various kinds, some of a pathogenic nature. These, when the soil is dry being carried in various directions by the currents of ground air and finding exit at the surface, may affect the atmosphere of the immediate or contiguous localities or may be carried to a considerable distance from the spot where they originated. If, on the other hand, such diffusion is prevented by the pressure or temperature of the air above or by blocking of the upper layer of the soil by water, they will tend to be carried directly into buildings along with the impure ground air.

In spring and early summer, however, the ground being cooler than the air above, the ground air being in consequence denser and heavier, is not so easily displaced as at other seasons of the year; in autumn, on the contrary, the ground air is displaced with greater ease, and so is more likely to be forced out from the interstices of the soil into the atmosphere above. These facts would afford an explanation of the comparatively slight prevalence in spring and early summer, and greater prevalence in autumn of certain epidemic infectious diseases, which may be thought to depend on movements of the ground air.

[illegible]

The level of the ground water and the amount of moisture in the soil above it has been shown to have considerable influence on the extent of the putrefactive processes going on in the soil; and these in turn will influence the [illegible] of air and drinking water, and so directly or [illegible] the health of the people [illegible] of the surface will cause a cold soil, and a damp

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air, and as a result, perhaps encourage such diseases as paroxysmal fevers, rheumatism, neuralgia and various lung affections.

For the most part typhoid fever spreads indirectly through the stools from one or more specific cases of the disease infecting drains, sewers, cesspools or the soil itself, by which means the drinking water, air or food becomes contaminated, and thus propagates the malady in various directions. The water, of course, usually becoming infected from having passed through already polluted earth, while milk is infected by the admixture of such water or from dairy utensils having been washed with it.

Sewer Gas.

A popular belief which requires some explanation here is that of the efficiency of broken drains in causing infectious diseases. A broken drain may and undoubtedly often does yield more or less objectionable and sometimes poisonous gases; but in the present state of our knowledge of the etiology it is very difficult, if not almost impossible, to understand how the escape of gases from such drains can possibly produce infectious diseases. Indirectly the gases arising from the leaks and breaks may have a toxic effect and thus lower vital resistance and increase susceptibility. To this extent and probably to this extent only, broken drains are a source of disease, so while bad smells may be regarded as significant of putrefaction, decay or even disease, and therefore useful warnings of trouble, they can not in the present state of our knowledge be regarded as true sources of infectious disease.

The truth appears to be rather that certain depressing physiological or constitutional effects are produced upon the human organism by the conditions which prevail in damp cellars and that these are efficacious in the production of

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specific disease only by virtue of such depression, which lowers the vital resistance and increases the susceptibility to specific disease germs derived from any source whatever. In the past, neglect of sanitary measures has led to plagues and pestilence to an extent difficult for us to appreciate. Were similar neglect to exist now when the population is so far more numerous and dense, who can conjecture the disastrous results. We are reminded every now and again by comparatively small local outbreaks of disease, of the necessity of paying due attention to this question of purity of air and cleanliness.

The Plague.

The history of many plagues and epidemics could be cited by way of illustration. I might mention the plague or black death in the 14th century when 24 000 000 are said to have died of it. In 1830, 60 000 people died of the pest in Bagdad. The great plague visited London in 1665 from which in a little over one year more than 100 000 persons died. During the remainder of the 19th century it appeared sporadically in Tripoli, Turkey, Persia and other Asiatic countries. In 1891 it reappeared in epidemic form in middle China. From this date it spread over China, reaching Canton in 1894, Hong Kong in 1896 and Bombay in the same year. It appeared in Oporto, Portugal, 1899; in Glasgow in 1900 and in San Francisco in 1901. The mortality from plague in India during the first six months of 1905 amounted to 878 602 souls, the highest record ever made in a similar length of time. The plague still exists and rages with fearful mortality in communities which have no regard for hygienic surroundings.

The plagues enumerated were the penalty paid by the community for allowing the houses to be crowded together, with narrow crooked alleys and passages which served as

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streets to which sunshine never had access, and which did not permit of proper circulation of air; for failing to provide any efficient means for the removal of the filth and sewage which remained in the street surface until washed away by rain; and in fact, for allowing a dense city to grow up without any efficient control in its growth and management.

The fearful ravages above recorded, however, give us only the death roll consequent upon those terrible epidemics. These outbreaks of plague were only the culmination of a long series of shockingly unhealthy conditions which had previously caused repeated outbreaks or explosions, but which at length developed to the enormous extent above set forth. These preceding conditions must have affected the general health of the population to a degree which it is impossible to estimate, and of which there is no sort of record direct or indirect.

The circumstances under which outbreaks of disease occur nowadays, terrible as they appear to us, are very different and even small as compared to the plagues of old, which ran their course until they had literally exhausted the supply of subjects to attack. The magnitude of the old epidemic is now rarely approached notwithstanding the vastly increased facilities that exist for the spread of diseases, owing to growth and intercommunication of the population.

By way of illustrating what can be accomplished by sanitary supervision, compare the present mortality statistics of the leading European countries and cities as well as some of the leading American cities, with former statistics for periods varying from a decade to sixty years.

NORWAY: The death rate from all causes for the last reported year, 14.8 in 1903, was 14.0 per cent lower than the average of the sixty years preceding and 5.1 per cent lower than the average of the ten years preceding. The average

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rate of the last reported ten years (15.5), was 10.9 per cent lower than the average of the preceding fifty years. The highest rate recorded in the past sixty years was 20.5 in 1848, the lowest 13.9 in 1902.

SWEDEN: The death rate from all causes for the last reported year, 15.1 in 1903, was 20.1 per cent lower than the average of the sixty years preceding and 5.6 per cent lower than the average of the preceding ten years. The average rate of the last reported ten years (15.9), was 17.6 per cent lower than the average of the preceding fifty years. The highest rate recorded in the past sixty years was 27.6 in 1857, the lowest 15.1 in 1898 and 1903.

ENGLAND AND WALES: The death rate from all causes for the last reported year, 15.4 in 1903, was 32.2 per cent lower than the average of ten years immediately preceding. The average rate of the last reported ten years (17.2) was 19.6 per cent lower than the average of the fifty years preceding. The highest rate recorded during the last sixty years was 25.1 in 1849; the lowest, 15.4 in 1903.

NETHERLANDS: The death rate from all causes for the last reported year, 15.6 in 1903, was 31.0 per cent lower than the average of the preceding fifty years and 11.4 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years was 27.7 per cent lower than the average of the forty-one preceding years. The highest rate recorded in the last fifty years was 31.2 in 1859; the lowest 15.6 in 1903.

DENMARK: The death rate from all causes for the last reported year, 15.8 in 1901, was 18.6 per cent lower than the average of the preceding sixty years and 9.7 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (17.0) was 14.1 per cent lower than the average of the fifty years preceding. The highest rate recorded during the last sixty years was 25.0 in 1853; the lowest, 15.5 in 1898.

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BELGIUM: The death rate from all causes for the last reported year 17.0 in 1903, was 22.4 per cent lower than the average of the preceding sixty years and 7.1 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (18.0) is 20 per cent lower than the average of the fifty years preceding. The highest rate recorded during the last sixty years was 30.3 in 1866; the lowest, 17.0 in 1903.

HOLLAND: The death rate from all causes for the last reported year, 17.2 in 1901, was 26.8 per cent lower than the average of the preceding sixty years and 6.5 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (18.1) was 25.8 per cent lower than the average of the preceding fifty years. The highest rate recorded during the last sixty years was 31.2 in 1847, 1849 and 1859; the lowest, 16.9 in 1897.

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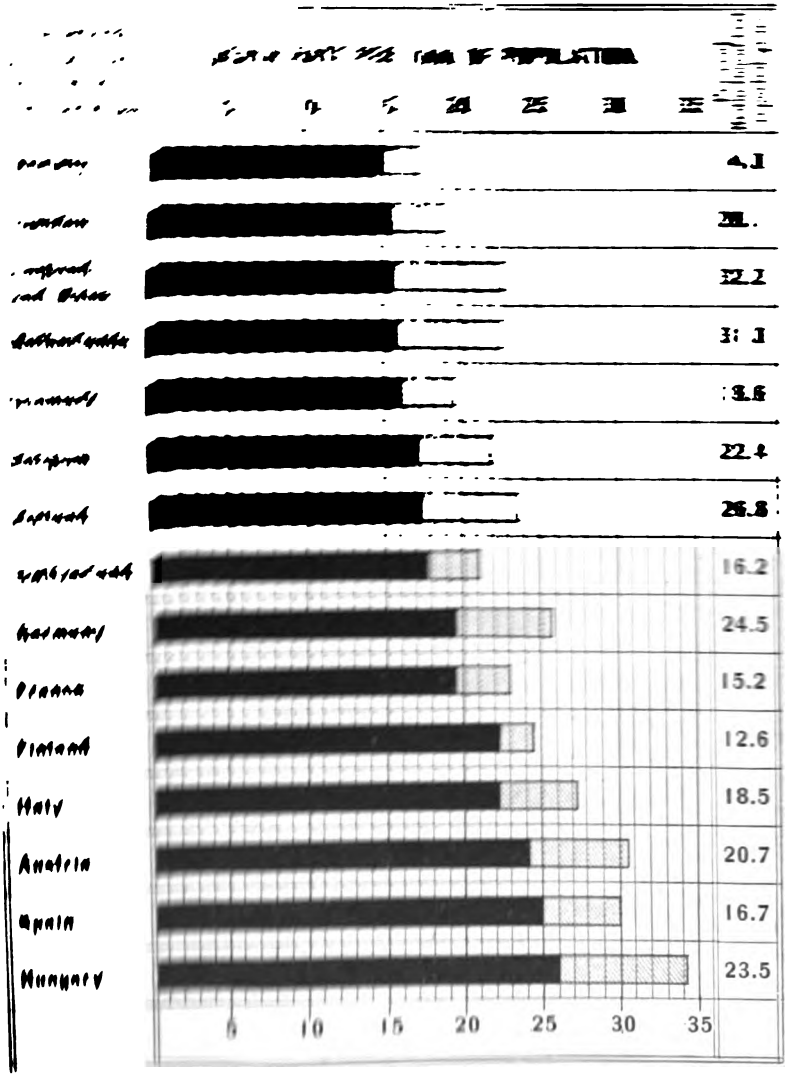

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SWITZERLAND: The death rate of the last reported year, 17.6 in 1903, was 16.2 per cent lower than the average of the preceding thirty-three years and 4.9 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (18.2) was 17.6 per cent lower than the average of the preceding twenty-four years. The highest rate recorded during the last thirty-four years was 27.8 in 1871, the lowest 17.2 in 1902.

GERMANY: The death rate from all causes for the last reported year, 19.4 in 1902, was 24.5 per cent lower than the average of the preceding sixty years and 11.8 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (21.5) was 18.3 per cent lower than the average of the fifty preceding years. The highest rate recorded during the last sixty years was 30.6 in 1866, the lowest 19.4 in 1902.

FRANCE: The death rate from all causes for the last reported year, 19.5 in 1902, was 15.2 per cent lower than the average of the sixty years preceding and 8.0 per cent lower than the average of the last reported ten years (20.9) and was 10.3 per cent lower than the average of the fifty preceding years. The highest rate recorded during the last sixty years was 35.1 in 1871, the lowest 19.5 in 1897 and 1902.

FINLAND: The death rate from all causes for the last reported year, 21.5 in 1900, was 12.6 per cent lower than the average of the preceding sixty years but was 9.7 per cent higher than the average of the ten years immediately preceding. The average rate of the last reported ten years (19.6) was 23.1 per cent lower than the average of the fifty preceding years. The highest rate recorded in the last sixty years was 77.6 in 1868, the lowest 17.4 in 1898.

ITALY: The death rate from all causes for the last reported year, 22.2 in 1903, was 18.5 per cent lower than the

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average of the thirty-nine preceding years and 5.1 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (23.1) was 19.5 per cent lower than the average rate of the thirty preceding years. The highest rate recorded during the last forty years was 34.3 in 1867, the lowest 21.9 in 1897 and 1899.

AUSTRIA: The death rate from all causes for the last reported year, 24.2 in 1901, was 20.7 per cent lower than the average of the sixty preceding years and 9.0 per cent lower than the average of the ten years immediately preceding. The average of the last reported ten years (26.2) was 16.3 per cent lower than the average of the preceding fifty years. The highest rate recorded during the last sixty years was 44.4 in 1847, the lowest 24.2 in 1901.

SPAIN: The death rate from all causes for the last reported year, 25.0 in 1903, was 16.7 per cent lower than the average of the 32 years reported between 1860 and 1903 and 12.9 per cent lower than the preceding ten years' average. The average of the last reported ten years (28.2) was 7.8 per cent lower than the average of the twenty-three years previously reported. The highest rate reported during the last thirty-seven years was 33.0 in 1865 and 1869; the lowest, 25.0 in 1903.

HUNGARY: The death rate from all causes for the last reported year, 26.1 in 1903, was 23.5 per cent lower than the average of the thirty-seven preceding years and 7.8 per cent lower than the average of the ten years immediately preceding. The average rate of the last reported ten years (27.8) was 22.4 per cent lower than the average of the preceding twenty-eight years. The highest rate recorded during the past thirty-eight years was 65.1 in 1873; the lowest, 25.4 in 1901.

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MORTALITY STATISTICS OF THE PRINCIPAL EUROPEAN COUNTRIES.

Death rates from all causes per 1000 of population (using the rates of the latest years for which data is available).

COUNTRIES. ARRANGED IN ORDER OF LOWEST DEATH RATE OF LAST REPORTED YEAR.	Comparing the rate of the last reported year with the average rate of the preceding 60 years.				Comparing rate of last reported year with average rate of preceding 10 years.			Comparing rate of last reported 10 years with average of preceding 50 years.		Highest and lowest rates reported during last 60 years.			
	Death rate of last reported year.		Average rate of the 60 years preceding.	Per cent. reduction of last reported year.	Average rate of 10 years preceding last reported year.	Per cent reduction in rate of last reported year.	Average rate of last reported 10 years.	Average rate of 50 years preceding last reported 10 years.	Per cent reduction in rate during last 10 yrs.	Highest Rate.		Lowest Rate.	
	Rate	Year								Rate	Year	Rate	Year
Norway	14.8	1903	17.2	14.0	15.6	5.1	15.5	17.4	10.9	20.5	1848	13.9	1902
Sweden	15.1	1903	18.9	20.1	16.0	5.6	15.9	19.3	17.6	27.6	1857	15.1	1896-1903
England and Wales	15.4	1903	22.7	32.2	17.6	12.5	17.2	21.4	19.6	25.1	1849	15.4	1903
Netherlands	15.6	1903	22.6 (50 yrs.)	31.0	17.6	11.4	17.2	23.8 (41 yrs.)	27.7	31.2	1859	15.6	1903
Denmark	15.8	1901	19.4	18.6	17 5	9.7	17.0	19.8	14.1	25.0	1853	15.5	1898
Belgium	17.0	1903	21.9	22.4	18.3	7.1	18.0	22.5	20.0	30.3	1866	17.0	1903
Holland	17.2	1901	23.5	26.8	18.4	6.5	18.1	24.4	25.8	31.2	1847-9-59	16.9	1897
Switzerland	17.6	1903	21.0 (33 yrs.)	16.2	18.5	4.9	18.2	22.1 (24 yrs.)	17.6	27.8	1871	17.2	1902
Germany	19.4	1902	25.7	24.5	22.0	11.8	21.5	26.3	18.3	30.6	1866	19.4	1902
France	19.5	1903	23.0	15.2	21.2	8.0	20.9	23.3	10.3	35.1	1871	19.5	1902-1897
Finland	21.5	1900	24.6	12.6	19.6	†9.7	19.6	25.5	23.1	77.6	1868	17.4	1898
Italy	22.2	1903	27.2 (39 yrs.)	18.5	23.4	5.1	23.1	28.7 (30 yrs.)	19.5	34.3	1867	21.9	1897-1899
Austria	24.2	1901	30.5	20.7	26.6	9 0	26.2	31.3	16.3	44.4	1847	24.2	1901
Spain	25.0	1903	*30.0 (32 yrs.)	16.7	28.7	12.9	28.2	30.6 (23 yrs.)	7.8	33.0	1865-69	25.0	1903
Hungary	26.1	1903	34.1 (37 yrs.)	23.5	28.3	7.8	27.8	35.8 (28 yrs.)	22.4	65.1	1873	25.4	1901

*For the 32 years reported between 1860 and 1903. †Increase.

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Mortality Statistics of the Principal American and European Cities.

Death Rates per 1000 of Population from all Causes.

Comparison of the rate for the year 1904 with the average rate of the preceding ten years, showing the percentage of reduction in the rate of 1904:

American.	Death rate 1904	Average annual death rate of the preceding ten years: 1894-1903	Per cent reduction of the 1904 rate
New York	20.0	21.1	5.2
Chicago	13.6	15.6	12.8
Philadelphia	18.4	19.1	3.7
St. Louis	17.3	17.6	1.7
Boston	18.3	20.9	12.4
Baltimore	20.0	20.4	2.0
Average of the six American cities	17.9	19.1	6.3
European.			
London	16.6	18.3	9.3
Paris	17.4	19.5	10.8
Berlin	16.9	17.9	5.6
St. Petersburg	23.7	26.7	11.2
Vienna	18.3	20.8	12.0
Brussels	14.5	17.1	15.2
Rome	18.7	19.2	2.6
Amsterdam	15.1	16.3	7.4
Copenhagen	15.8	17.6	10.2
Stockholm	14.4	16.8	14.3
Average of the ten European cities	17.1	19.0	10.0

London: The death rate from all causes for the year 1905 (15.6) is 27.4 per cent lower than the average of the fifty years preceding and 14.3 per cent lower than the average of the ten years immediately preceding.

Paris: The death rate for the year 1904 (17.4) is 28.4 per cent lower than the average of the preceding fifty years and 0.8 per cent lower than the average of the ten years immediately preceding 1904.

Other European Cities: Comparing the rate of the latest year, 1904, for which statistics are at hand, with the average rate of the preceding ten years, 1894-1903, the percentage of reduction in the 1904 rates are as follows:

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Berlin 5.6 per cent; St. Petersburg, 11.2 per cent; Vienna, 12.0 per cent; Brussels, 15.2 per cent; Rome, 2.6 per cent; Amsterdam, 7.4 per cent; Copenhagen, 10.2 per cent and Stockholm, 14.3 per cent.

AMERICAN CITIES: (On the same basis.)

NEW YORK: The annual rate of the year 1905 (18.3), is 11.6 per cent lower than the average preceding ten years (20.7). "Loose manner of keeping records of deaths in the Boroughs of Queens and Richmond previous to consolidation, prevents comparison with earlier years."

PHILADELPHIA: The death rate for the year 1905 (17.3) is 8.9 per cent lower than the average of the preceding ten years and 17.6 per cent lower than the average annual rate of the preceding forty-four years.

BOSTON: The death rate of the year 1905 (18.5) is 19.9 per cent lower than the average of the preceding fifty years and 7.5 per cent lower than the average of the ten years immediately preceding.

ST. LOUIS: The death rate of the year 1904 was 1.7 per cent lower than the average of the preceding ten years and Baltimore's 1904 rate was 2.0 per cent lower.

CHICAGO: The annual rate of the year 1905 (13.7) is 9.3 per cent lower than the average of the preceding ten years, (15.1); 33.8 per cent lower than the average of the preceding fifty years and 42.9 per cent lower than the average of the sixty years preceding. The highest rate recorded during the past sixty years was 73.8 in 1849 (Asiatic cholera epidemic), the lowest 13.6 in 1904. The rates for 1905 and 1901, 13.7 and 13.9 respectively, were nearly as low as the lowest and the rate of the current year (1906) is more than likely to establish a new low record. More than 70 per cent of the total reduction in the mortality rate of the last forty years occurred in the past ten years, 1896-1905.

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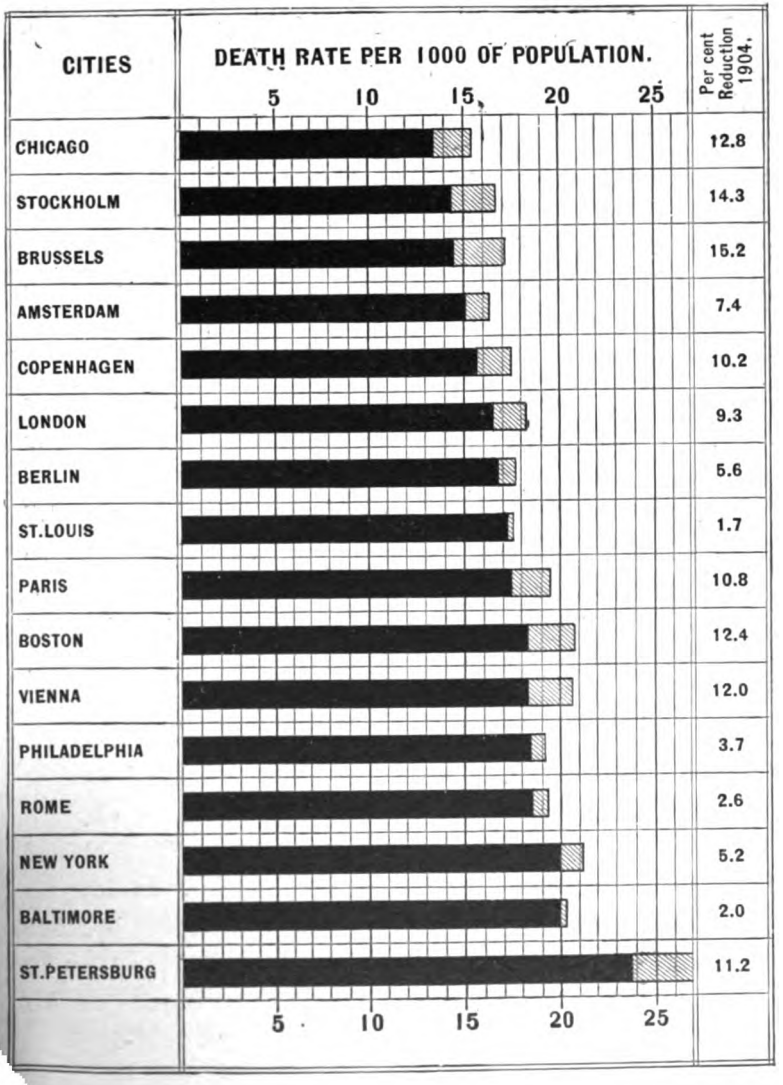
Diagram B—Showing Reduction in the Death Rates of the Principal American and European Cities.

Total length of each line represents the average mortality rate from all causes, for the decade 1894-1903.—Solid black portion of each line represents the rates for 1904.—Cities arranged in order of lowest rate in 1904.



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The average rate of the six principal American cities in 1904 was 17.9, this being a reduction of 6.3 per cent from the average of the ten preceding years.

The average rate of the ten principal European cities in 1904 was 17.1 or 10.0 per cent less than the average rate of the ten preceding years.

The average rate of the six American cities exceeded the average rate of the ten European cities only 4.7 per cent in 1904 and only .6 of 1 per cent in the rate of the ten year period, 1894-1903.

Lives Saved by Sanitary Supervision.

Do you know that a quarter of a million people are alive today in Chicago who probably would have died had it not been for the magnificent work the HEALTH DEPARTMENT has been doing in the way of sanitary supervision?

For the year ended December 31, 1905, the death rate was 13.67 for each thousand of the population. This death rate is the lowest of any city in the world of a population of 300 000 or over.

If you want to understand how healthy Chicago has become of recent years, here are the figures:

During the last decade, 1896-1905, there occurred in Chicago 251 600 deaths from all causes, equivalent to an average annual rate of 14.7. During the forty years preceding the last decade the average annual death rate was 21.9 or 32.9 per cent in excess of the rate of the last ten years. Had the death rate of the last forty years prevailed during the last ten years there would have been 124 421 more deaths than actually did occur. This means that 12 442 lives have been saved annually during the past ten years. Of the annual constructive saving of lives more than 86.5 per cent has been of children under five years of age.

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A further comparison of these two periods, the last decade and the preceding forty years, will give some idea of what may be accomplished through medical inspection and practical work in the field of preventive medicine.

The greatest reductions of mortality are among the diseases over which sanitary administration and sanitary conditions have the greatest and most direct control.

A study of the contagious diseases death-rate affords the best idea of the value of sanitary measures in the reduction of mortality. (See diagram "C.")

Reduced Mortality.

The reduced mortality rates from the nine chief contagious or infectious diseases — smallpox, malaria, scarlet fever, diphtheria, measles, diarrheal diseases, typhoid fever, whooping cough and consumption — mean that there have been 89 544 fewer deaths from these causes during the past ten years than would have occurred had the average death rate of the preceding forty years prevailed.

Let us go a little further into details. Smallpox — with which the Department deals most directly and with greatest authority — shows the greatest percentage of reduction in mortality of all the controllable diseases. The average death rate of the past ten years was only 0.1 per 10 000 of population, the total deaths during this period were only 151. The average rate of the forty years, 1856-1895, was 3.5 per 10 000. The reduction of the rate is 97.1 per cent. Had the rate maintained the average of the forty-year period there would have been 6009 deaths from smallpox instead of 151 — a saving of 5858 from this "pest."

Diphtheria and croup — the death rate of which in the earlier period was 14.5 per 10 000 is now 4.2 or 71.0 per cent lower and is no longer the most dreaded disease of childhood. The reduced death rate means a saving of 17 967 lives during the last ten years.

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Typhoid fever and the diarrheal diseases may be considered together, for they are essentially the "impure water diseases." In the earlier period the death rate from typhoid was 7.1 per 10 000 whereas in the later period it was 3.1, a reduction of 56.3 per cent. The reduced rate is equivalent to a saving of 6938 lives during the past ten years.

Diarrheal diseases produced a rate of 32.8 per 10 000 in the earlier period, this being reduced to 14.1 in the later period, a decline of 57.0 per cent, meaning a constructive saving of 32 548 lives in the years 1896-1905.

Constant supervision of water supply with publicity of its daily condition; the regulation of lake dumping; securing sewage diversion from the lake; the correction of more than 100 local defects in tunnels and pumping stations in a single year; the completion of the drainage canal and a vast amount of work for the sanitary district in the chemical and bacteriologic examinations of waters from the streams between Chicago and St. Louis are among the agencies which have reduced the typhoid fever and diarrheal death rates to such a remarkable extent.

Measles, scarlet fever and whooping cough, three of the worst enemies of child life, for none of which has there yet been found a specific such as antitoxin is for diphtheria or vaccination for smallpox—must be conceded to owe their decrease to improved methods in the handling of contagious diseases, to improved hygienic conditions and to better nutrition and care of the young, whereby their vital resistance against all disease is increased.

In the earlier period measles shows an average annual rate of 2.5 per 10 000; in the later period a rate of 0.8, the percentage of reduction being 68 and the constructive saving 2828 lives during the last ten years.

Scarlet fever mortality has been reduced 84.6 per cent, from a death rate of 7.8 to 1.2 per 10 000. There were

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11 304 fewer deaths during the last ten years than there would have been had the rate of the earlier period prevailed.

Whooping cough shows a reduction of 50 per cent in rate, from 2.4 to 1.2, a saving of 1989, or nearly 200 lives a year for the last ten years.

Malaria, which formerly prevailed to a considerable extent in this community is now practically an extinct disease. The rate of the forty years, ended 1895, was 1.5; during the past ten years, only 0.1. The reduced rate is equivalent to a saving of 2352 lives during the ten years ended 1905.

Finally consumption itself—until within the last few years and until superseded by pneumonia, the cause of the greatest number of deaths—shows a decrease of 22.7 per cent in the rate, from 19.8 to 15.3, and this reduction means, constructively, a saving of 7710 lives in the past ten years.

Two of the most dreaded and fatal diseases known to mankind, Asiatic cholera and typhus fever, prevailed in this city during the early days of its development, but they have long since succumbed to the advance of sanitation and are now totally extinct in these parts.

Asiatic cholera prevailed in Chicago from 1851 to 1873, causing 3503 deaths, this being equivalent to an average annual rate of 64.7 per 10 000 of the population. No deaths have occurred from this cause since 1873.

Typhus fever was present during most of the years between 1851 and 1886, but no death or case has been recorded since April of the latter year.

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STATEMENT OF CHICAGO MORTALITY SHOWING REDUCTION IN DEATH RATES OF CERTAIN DISEASES DIRECTLY AFFECTED BY SANITARY MEASURES AND THE CONSTRUCTIVE SAVING OF LIVES THERETO ATTRIBUTABLE.

Rates per 10 000 of Population.

CAUSES OF DEATH. ARRANGED IN ORDER OF GREATEST PERCENTAGE OF REDUCTION DURING LAST DECADE.	Average yearly death rate of the last decade, 1896–1905.	Average yearly death rate of 40-year period, 1856–1895.	Per cent reduction in rates of last decade.	Total deaths of the 10 years, 1896–1905.	Total deaths that would have occurred had the rate of the 40-year period prevailed during last ten years.	Constructive saving of lives during last 10 years, 1896–1905.
Smallpox	0.1	3.5	97.1	151	6 009	5 858
Malaria	0.1	1.5	93.3	223	2 575	2 352
Scarlet fever	1.2	7.8	84.6	2 089	13 393	11 304
Diphtheria and Croup	4.2	14.5	71.0	6 929	24 896	17 967
Measles	0.8	2.5	68.0	1 464	4 292	2 828
Diarrheal Diseases	14.1	33.8	57.0	23 769	56 317	32 548
Typhoid fever	3.1	7.1	56.3	5 203	12 191	6 988
Whooping cough	1.2	2.4	50.0	2 132	4 121	1 989
Consumption (lungs)	15.3	19.8	22.7	26 286	33 996	7 710
Totals	....	....	....	68 246	157 790	89 544

Rates per 1 000 of Population.

All Causes and Age Groups.						
All causes, all ages	14.7	21.9	32.9	251 601	376 022	124 421
Under 1 year of age	3.3	*6.9	52.2	54 883	118 473	63 590
1 to 5 years of age	1.6	*4.2	61.9	28 082	72 114	44 032
Total under 5 years	4.9	*11.0	55.5	82 915	190 587	107 672

*Twenty-eight years, 1868–1895.

STATEMENT OF CHICAGO MORTALITY SHOWING INCREASE IN THE DEATH RATES FROM CERTAIN DISEASES NOT AFFECTED BY SANITARY MEASURES.

Deaths per 10 000 of Population.

IMPORTANT CAUSES OF DEATH THAT ARE INCREASING.	Average yearly rate of the last decade, 1896–1905.	Average rate of the 40-year period 1856–1895.	Per cent increase in rate of last decade.
Bright's Disease	7.3	*2.7	170.4
Cancer	5.5	2.8	96.4
Heart Disease	9.9	5.1	94.1
Pneumonia	18.7	11.3	65.5

*Thirty-three years.

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DIAGRAM C—SHOWING REDUCTION OF MORTALITY FROM CERTAIN DISEASES DIRECTLY AFFECTED BY SANITARY MEASURES IN THE CITY OF CHICAGO.

Total length of each line represents the specified disease mortality of the forty-year period, 1856-1895.—Solid black portions represent the mortality of the ten-year period, 1896-1905.

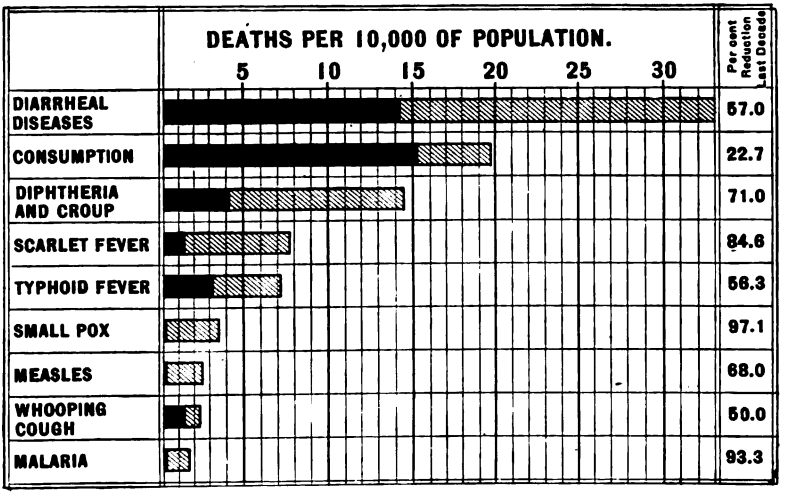
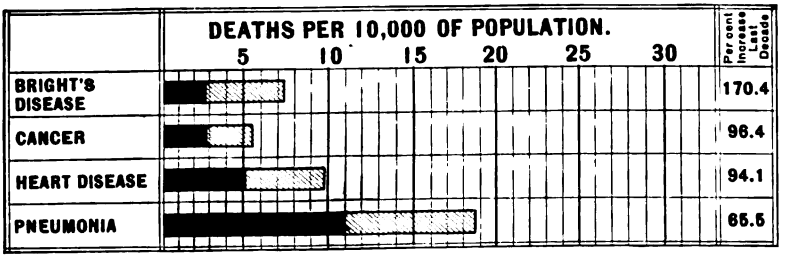


DIAGRAM SHOWING INCREASED MORTALITY FROM CERTAIN DISEASES NOT DIRECTLY AFFECTED BY SANITARY MEASURES.

Solid black lines represent the average yearly death rates for the forty-year period, 1856-1895. —Total length of each line represents the average yearly death rate for the ten-year period, 1896-1905.



Among other important causes of death that show decrease in recent years are bronchitis, cerebral apoplexy and the nervous diseases. With these decreases neither medical

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science nor sanitary administration can claim to have had much to do. They must be attributed to the general improvement of physique and increased vitality of the people of Chicago, due to saner modes of life, to better personal hygiene and to the popular education in sanitary matters which has made such vast strides in the last quarter of a century.

By way of contrast and to further emphasize the effect of sanitary administration in the reduction of mortality let me show you the increase in four of the important causes of death that are not directly amenable to sanitary measures. (See diagram "C.")

1. The average death rate from Bright's disease for the thirty-three years ended 1895, was 2.7 per 10 000; during the last ten years the rate has increased to 7.3 or 170.4 per cent.

2. Cancer produced an average rate of 2.8 per 10 000 during the forty years' period and 5.5 during the last ten years; an increase of 96.4 per cent.

3. The death rate from the diseases of the heart show an increase of 94.1 per cent; from 5.1 per 10 000 in the forty-year period to 9.9 for the last ten years.

4. Pneumonia, which fifty years ago occupied eighth place in order of highest death rate, is now the leading cause in this community. Its rate per 10 000 for the ten year period ending 1865 was 6.72, for the forty years terminating with 1895 the average rate was 11.3 and during the past ten years it increased to 18.7. The increase of the last ten-year period over the ten-year period of 1856-65 is more than 179 per cent and over the average of the forty years of 65½ per cent.

In 1875 there died in Chicago 7899 persons at an average age of 16 years, 2 months and 12 days. In 1905 the average age of the 27 212 decedents was 31 years, 10 months, an increase of more than 96.5 per cent. Measured by the

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average age at death of all who died in the city of Chicago thirty years ago and of those who died in 1905 the average duration of life in this city has nearly doubled in a single generation. That modern sanitary measures and the application of preventive medicine are chiefly responsible for this very material lengthening of human life in this community is the only fair conclusion.

There are in the United States today approximately 80 000 000 people, one million or more of whom will die each year, and of the total number of deaths, 25 per cent are unnecessary and can be prevented.

This statement will not be disputed, but it is not so well known that the annual expenditure of a comparatively small amount of money in the improvement of sanitary conditions and in the investigation of sanitary problems, would prevent many epidemics and in so doing would make the people not only healthier, but at the same time wealthier.

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DEPARTMENT OF HEALTH

CITY OF CHICAGO

1906

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REPORTS AND VITAL STATISTICS

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Department of Health

CITY OF CHICAGO

1906

REPORTS

OF THE

Director of the Laboratories
Division and Bureau Chiefs
Free Public Baths, Etc.

VITAL STATISTICS

AND

Chronological Summary of Chicago
Mortality Fifty Years: 1857-1906

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REPORT OF THE HEALTH DEPARTMENT LABORATORIES FOR 1906.

JOSEPH FAVIL BIEHN, A. M., M. D., DIRECTOR AND BACTERIOLOGIST.

DURING the year 1906, 65 918 analyses were made. This is an increase of 36 584, or nearly 125 per cent over the previous year. Of this number more than 50 000 were milk samples, an increase of nearly 25 000 over the number analyzed in 1905, as is shown in the appended table. All of these milk and cream samples have been analyzed, not only for standard as regards purity, per cent of butter fat, total solids, etc., but also for the presence of various adulterants and preservatives.

All samples of milk and cream are now tested for boric acid, as well as formaldehyd, by a new method a description of which appears later in this report.

More than 4000 samples of milk have also been examined bacteriologically, although the standard as set forth in the present milk ordinance of this city is chemical only.

An increased number of dairy and milk inspectors, with the resultant increase in the number of milk samples, has necessitated the employment of two milk testers and a special chemist. The efficiency of this branch of the Laboratory has been largely increased. The work has been greatly facilitated by the addition of a specially designed electrical milk testing machine, a polariscope and other special apparatus. A number of new methods of milk analysis have been worked out by the chemists during the year.

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Food Inspection.

An increase in the food inspection forces under the direction of a Chief Food Inspector has resulted in the condemnation and destruction of more than 10 000 000 pounds of unfit and unwholesome foodstuffs, as compared with less than 4 000 000 pounds in 1905, which was a larger amount than in any previous year. This represents a saving of more than $1 000 000 and untold sickness or even death for the citizens of Chicago. Of this amount, 7 000 000 pounds were condemned at the Union stockyards and 3 000 000 pounds in the various wholesale and retail houses in the city.

Particular attention was given to canned goods, more than 600 000 pounds of which were condemned and destroyed. While in general the foods found in the city markets were wholesome, many adulterated and preserved foods have been encountered. The DEPARTMENT has found upon analysis of the food products prepared by several of the large wholesale manufacturers, that many of these houses prepared two brands of many of their products. One brand is sold in the various States, such as Minnesota, Wisconsin, etc., to conform with the stringent food laws in force there, and the other brand is manufactured for the Chicago and Illinois trade. This brand we find often contains preservatives and adulterants, and many of these samples also contain the various anilin dyes. In no instance did the labels upon these packages state that the contents were preserved or adulterated in any way. This is sufficient proof that each State and city must have a stringent and efficiently enforced food law, as the National Food Law, which goes into effect the first of January, 1907, will not protect these cities from inferior, adulterated, misbranded food products that are manufactured and sold within their limits.

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Cold Storage.

More than 39 000 pounds of poultry were condemned and destroyed. Experiments in the Laboratory, carried on in order to secure data for the proposed ordinance for the regulation and inspection of the cold-storage industry, have conclusively proven that while the cold-storage industry is no doubt one of the most valuable and efficient means of preserving perishable foodstuffs, its improper use by many necessitates a vigilant and efficient inspection and regulation.

While it is true that cold-storage at a proper temperature and with due care to its maintenance will preserve food products with practically little or no deterioration, and the food stuffs will come out at the end of six or ten months in practically their original condition, they will not be improved one iota. And unless they are fresh, wholesome and properly prepared when placed in cold-storage they will have deteriorated to such an extent, even in a few months, as to be totally unfit for human consumption.

Hundreds of pounds of poultry have been condemned in the retail markets that showed evidences of having been reprocessed after removal from cold-storage. A chemical analysis of this poultry demonstrated the presence of peroxide of hydrogen, which had been used to remove the slime, discoloration and putrid odor.

Large numbers of putrefactive bacteria and traces of ptomains have been repeatedly found in the breast muscles of undrawn cold-storage poultry. These bacteria and their products, it has been proven, were absorbed from the intestines and their contents which remained in the fowl.

Candies.

A special investigation of candy was undertaken in May. Several thousand samples were analyzed, and while none of

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it was found to contain any mineral filling or metallic poison, many samples contained anilin dyes, artificial synthetic flavors, paraffin and stearin, lamp black, artificial cocoanut (made from corn), and liquors of various kinds.

Some brandy drops were found that contained as much as four per cent of alcohol.

It was found that the glucose used by many of the small manufacturers of candy contained a large per cent of sulphuric acid, and much of the shredded cocoanut was preserved with sulphites. Many of the chocolate candies were prepared with an artificial chocolate composed of saccharose, stearin and a small per cent of cocoa.

Fish.

The fish inspector has condemned over one million pounds of fish, and has caused the arrest of seven dealers who were selling cooked, dried and colored fish for smoked fish.

The most important advance made by the Laboratory this year for the protection and preservation of the public health of the city has been along the lines of the safeguarding of food supplies of all kinds.

Restaurants.

With a view of bettering the sanitary conditions and protecting the people from consuming unwholesome food, the municipal authorities have licensed all places where food is cooked and consumed, and this ordinance has been vigorously enforced. It was soon found that there was a wide field for improvement along the lines herein suggested, and conditions have improved materially as a result of this inspection and licensing of restaurants. Upwards of 1500 places have been inspected; forty have been refused licenses and closed up, and 129 keepers have been prosecuted for insanitary condition of premises or uncleanly methods of food preparation, or for having impure food in their possession.

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From all these efforts to improve the food supply and its handling it results that the Chicago citizen was never before so wholesomely and so nutritiously fed, nor in such a cleanly fashion.

Ice Cream.

Inspection of ice cream was begun for the first time during July, 1906. About 500 samples were examined during that month and only 10 per cent of them contained the required 12 per cent of butter fat. Much of the ice cream was found to be made of condensed skimmed milk. This gives it the gritty, sandy taste so often noticed, which is due to the salts and casein contained in the condensed skimmed milk. A number of samples taken from Greek fruit stores contained a large amount of anilin dye, and practically all contained artificial synthetic flavors. None of these samples contained more than 6 per cent of butter fat. That is, they are less than 50 per cent cream. Most of them contained gelatin, which is very prone to decomposition by bacteria, especially if the cream be allowed to melt, with the resultant formation of ptomains. One death was reported from this cause and the presence of ptomains in the ice cream was demonstrated both chemically and physiologically. These ptomains are tasteless, and in many cases of ice cream poisoning due to ptomains, nothing is suspected at the time the cream is eaten.

These conditions usually are found only in ice cream that has melted and been returned to the manufacturer to be refrozen.

A great many samples were found to contain starch and borax. One was found to contain a large percentage of artificial fat.

Meat.

On March 21, 1906, the United States government sent to Chicago a number of pathologists from the Bureau of

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Animal Industry, who, together with the Director of the Laboratory, conferred upon the rules and regulations which are now the standard for the condemnations of meat by the DEPARTMENT inspectors. This was approved by the Mayor, COMMISSIONER OF HEALTH and the Secretary of Agriculture. These rules and regulations form the legal basis of defense for the City in its meat condemnations.

On this commission were Dr. John R. Mohler, Chief of the Pathologic Division; Dr. Rice P. Steddon, Chief Inspector of the Bureau of Animal Industry, and Geo. C. McCabe, General Solicitor of the Department of Agriculture. This commission and the Director of the DEPARTMENT OF HEALTH Laboratories agreed that there was a substantial unanimity of opinion between the Department of Agriculture and the City HEALTH DEPARTMENT on the subject of regulations governing the passing and condemnation of meats. It was further agreed that the two Departments should endeavor to co-operate in every way and work in close harmony.

A second committee, composed of Drs. L. Hektoen (chairman), W. A. Evans and Maximilian Herzog, was appointed by the Chicago Medical Society. This committee dealt exclusively with the sufficiency of the "Instructions to Meat Inspectors" of the DEPARTMENT OF HEALTH, City of Chicago, with reference to the protection of the health of the consumer and of the public health.

The sole adverse criticism of the "Instructions"—where they differ from the regulations of the U. S. Bureau of Animal Industry, upon which they are based—is that they are "too severe," "too stringent."

The following is a copy of the instructions to meat inspectors and the rules for the condemnation of meat:

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INSTRUCTIONS TO MEAT INSPECTORS.

DEPARTMENT OF HEALTH, CITY OF CHICAGO, 1906.

You are hereby authorized to enforce the City Ordinances relating to meat and food inspection, Sections 1153 to 1175 inclusive, and Sections 1210 to 1218 inclusive, and under the latest modified rules of the Department of Agriculture, as amended February 1, 1906. copies of which you have in your possession:

All animals found upon examination to be affected with any of the following diseases or conditions shall be *condemned and destroyed:*

Tuberculosis, Texas Fever, Actinomycosis, Black Leg, Pneumonia, Pyemia, Septicemia. Rabies, Hog Cholera, Swine Plague, Anthrax, Mange or Scab, Hemorrhagic Septicemia, Pleurisy, Enteritis, Peritonitis, Metritis, Malignant Epizootic Catarrh, and animals in an advanced stage of pregnancy, or within ten days after Parturition; animals with extensive bruises and injuries; tumors; abscesses: anemic or emaciated animals; immature animals; calves under four weeks of age; any disease or injury or elevation of temperature so affecting the animal as to make the flesh unfit for human food.

Any and all animals affected with any of the diseases or conditions named below shall be disposed of according to the following instructions:

TUBERCULOSIS. All animals affected with tuberculosis of a generalized or extensive character shall be condemned and destroyed. The carcass may be passed if the tuberculosis is slight, incapsulated or calcified, and limited to one organ or one group of lymphatic glands. The lesions and the surrounding tissues must be removed and condemned.

ACTINOMYCOSIS. The entire carcass shall be condemned whenever the actinomycotic abscess opens into the mouth, pharynx, larynx or any part of the digestive or respiratory tract, or one group of the lymphatic glands is involved, or when the lesions have become generalized, or if the animal be affected with tuberculosis or any other disease. The animal may be passed if the lesions are small, calcified or incapsulated and confined to the head or neck. These affected parts and the surrounding flesh are to be condemned and destroyed.

ICTERUS. All animals showing evidences of Icterus (Jaundice), after proper cooling, shall be condemned and destroyed.

All animals affected with Uremia shall be condemned and destroyed.

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All animals that have died before slaughtering shall be condemned and destroyed.

All meats—fresh, smoked, salted or otherwise treated—which are found to be unwholesome, tainted, sour, decomposed or otherwise unfit for human food shall be condemned and destroyed.

All animals or parts of animals or meat or food of any kind that is condemned shall be tagged immediately with a tag furnished by the Department, having upon it in large red letters "Condemned."

All condemned carcasses and parts shall be tanked and destroyed under the personal supervision and direction of a meat inspector who shall seal the tank after the material has been placed therein, and break such seal after he is satisfied that the steam which has been turned into the tank has completely destroyed the meat.

In all cases where the inspector is not perfectly satisfied that the animal should be condemned, it shall be tagged and portions of the lesion removed and brought to the Laboratory for an examination and diagnosis by the pathologist.

SPECIAL AS TO "LUMPY JAW."

To the Chief Meat Inspector:

While Actinomycosis is usually confined to the head, and may be said, in one sense, to be a localized disease, and while some inspectors condemn only the part involved, I believe it is safest and most practicable to condemn the entire carcass whenever the Actinomycotic abscess opens into the mouth, pharynx, larynx or any part of the digestive or respiratory tract; or when the lymphatic glands are involved; or where there are Actinomycotic Tumors in the lungs; or where the lesions have become generalized, since generalization in Actinomycosis appears to run a very atypic course, making the detection of all foci inside the muscle very difficult; therefore the entire carcass is to be condemned.

In cases where the Actinomycotic lesions are positively localized, the infected part may be cut away and the remainder of the carcass used.

These instructions apply only to "Lumpy Jaw." There may be other reasons why you should want to condemn a carcass, and it is then a matter of judgment for you and your men. But you should never hesitate if you believe the animal to be not fit for human food.

C. J. WHALEN, M. D.,
Commissioner of Health, City of Chicago.

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Bacteriologic Examinations.

The Bacteriologic Laboratory has made 11 275 examinations for physicians during 1906. This is an increase of 2431 over the number for 1905. The number of throat cultures examined has increased from 1616 to 1775 and the per cent containing diphtheria bacilli has increased from 17.14 to 18.42 per cent. The number of specimens of blood submitted by physicians for Widal examinations has decreased from 3462 in 1905 to 2839 in 1906 and the per cent of positive reactions has also decreased from 27.7 per cent to 23.1 per cent.

It is very evident that an increasing number of physicians in the City of Chicago are examining their own diphtheria cultures, for while the Laboratory has prepared and distributed over 28 000 outfits containing serum boxes for diphtheria diagnosis, only a little over 1700 of this number have been returned to the Laboratory for examination.

	1904		1905		1906	
Number of throat cultures examined..	1381	Per cent	1616	Per cent	1775	Per cent
Number containing diphtheria bacilli..	373	27	277	17	327	18
Number containing streptococci.....	287	20	782	48	946	53
Number containing staphylococci.....	998	72	646	39	714	40
Number containing influenza bacilli ...	375	27	411	25	328	18

Widal Reaction.

The Laboratories have examined 2839 specimens of blood for the Widal serum reaction. This represents only the number of specimens received and tested with the type "A" or Blue Typhoid Bacillus (so-called because it turns Litmus milk red at first, then, after three or four days, blue). This culture was imported from Eberth's Laboratory in 1896, and is the common typhoid organism affecting patients in Chicago.

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If the reaction is negative and the patient has been ill more than seven days, a test is then made with the type "B" or Red Typhoid Bacillus (this turns Litmus milk red and it remains red).

If both of these are negative after their second test, should the attending physician desire it, tests are then made with the following paratyphoid organisms:

Paratyphoid "A," Scott.
Paratyphoid "B," Smith.
Paratyphoid "B," Ford.
Paracolon bacillus, Buxton.

Or if the patient be a child and a test is desired, the following were used:

Dysentery bacillus of Hiss or Fulton or Flexon.

Several hundred paratyphoid reactions have been made and a great many positive reactions have been obtained. This work is being further perfected, and the Laboratories are now in a position to make all or any of these serum tests whenever desired.

Widals Made During the Year 1906.

	Positive	Negative	Doubtful	Total	Per cent Positive
January	53	174	12	239	22.1
February	40	143	9	192	20.8
March	43	159	9	211	20.3
April	37	167	12	216	17.1
May	54	164	9	227	23.8
June	32	153	4	189	16.9
July	52	159	11	222	23.4
August	64	199	23	286	22.4
September	95	191	19	305	31.1
October	76	205	19	300	25.3
November	79	175	6	260	30.4
December	31	157	4	192	16.1
	656	2046	137	2839	23.1

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Bacteria in Street Cars.

Bacteriologic examinations of the air of street cars made by the Director of the Laboratory disclose the fact that in 146 examinations the number of bacteria in cars with all the seats occupied, averaged four times more than the number in the outside air. In cars that were crowded by "strap-hangers" during the rush hours in the morning and evening, the number of bacteria showed an increase equal to fifteen times that of the same cars when only the seats were occupied by passengers.

In an examination of sputa collected from the floors and platforms of the cars, tubercle bacilli were found four times, influenza bacilli twelve times and pneumococci nine times out of seventeen examinations; some of the specimens containing both of the latter organisms. No effort by conductors to prevent spitting in the cars was observed during these examinations.

The need of some restriction of overcrowding and of effective cleansing and disinfection of the street cars could not be more strikingly shown.

The COMMISSIONER renews the oft-repeated advice of the DEPARTMENT:—

"Shun the over-crowded, filthy, disease-breeding street car.

"The able-bodied should walk any reasonable distance rather than enter one.

"If the entire distance be too great to walk, get out and walk the last mile or so.

"The exercise in the open air will help disinfect the air passages."

Bacteria in Milk.

The following experiments were undertaken by the Director of the Laboratories to ascertain the bacterial content of the milk supply with a view of bettering conditions of production, handling, etc.:

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One hundred samples of milk, purchased of various dealers in different sections of the city, consisting of bulk and bottled milk, from 24 to 48 hours old, were found to contain from 120 000 to 18 000 000 bacteria per cc., the average being 1 895 000 bacteria per cc.

Ninety additional samples were examined and found to contain from 10 000 to 430 000 bacteria per cc., the average being 80 000 bacteria per cc. These samples were guaranteed to be only 12 hours old.

From the above it is very evident that, other things being equal, 12-hour old milk, as found on the Chicago market, is very satisfactory from a bacteriological standpoint, whereas the condition of the 24-hour old milk is manifestly unsatisfactory. However, mere numbers do not constitute a scientific standard for milk, for it is well-known that milk containing a large number of bacteria (most of which are lactic acid bacilli) may not be harmful, although suspicious, whereas only a few typhoid bacilli in milk may be decidedly dangerous.

In the examination of 450 samples of milk, bought in the open market, pathogenic pus-producing bacteria were found in two samples, members of the colon bacilli group in four, and streptococci in thirty-seven; none of the streptococci, however, were pathogenic to guinea pigs.

Experiments were also instituted to ascertain the conditions that produced this enormous number of bacteria found in 24-hour milk.

The results given are averages of eight experiments, all of which coincided, practically, so far as the figures given are concerned. In each experiment an eight-gallon can was filled with milk immediately after milking, and was found to contain 11 500 bacteria per cc. This was now divided into equal portions and placed in cans holding four gallons each.

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These were labeled "A" and "B." Sample "A" was turned over to the farmer to be treated precisely as the rest of his milk, and shipped by him to his dealer. Sample "B" was immediately cooled to 45° F.; it was then iced and shipped to the city with the other can; except for the immediate cooling and icing, the condition of the two cans and method of treating were the same. The milk was morning's milk, drawn at 6 A. M., sent to the shipping platform at 10 A. M., arriving at the city at 11:30 A. M., having come a distance of 28 miles. It was then taken by the dealer to his depot and distributed to his customers the next morning, it being twenty-four hours old when it reached the customers.

Samples were taken from both cans and immediately examined, with results as shown by the following table:

Age.	Place.	Bacteria per cc. Sample A.	Sample B.
0	Cow barn.....	11 500	11 500
3 hours.	Shipping platform.....	18 000	11 000
6 hours.	City platform.....	102 000	8 000
12 hours.	Dealer's vat	114 000	7 800
24 hours.	Delivered to customer.....	1 300 000	62 000

From this it can be seen that if milk be properly treated by immediate cooling and icing in transit, the number of bacteria can be materially reduced, irrespective of the method of production.

It will also be seen that milk handled according to the present methods still presents a very satisfactory condition from a bacteriological standpoint at the end of twelve hours. The handling of the milk on the farm, of course, influences greatly the number of bacteria it contains. A clean dairy will produce milk containing from one to 15 000 bacteria. If the dairy is not very clean the milk will contain from 30 000 to 50 000 bacteria per cc., and in a dirty dairy milk will contain from 300 000 to 1 000 000 bacteria per cc., immediately after milking. However, the number of bacteria at the start

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gives very little indication of the number at the end of twenty-four hours, even under similar conditions.

Milk drawn into a sterile bottle contains on an average 840 bacteria per cc., whereas milk drawn into an ordinary open pail, from the same cows, at the same time, contained on an average 30 000 bacteria per cc. These bacteria come mostly from the dust or dirt for which the cow is usually directly responsible. The longer the milk is exposed to the air the more bacteria we find.

Immediate cooling is also a very important factor. The secret of satisfactory milk, from a bacteriological standpoint, lies in the cleanliness of production and handling, the immediate cooling and keeping at a low temperature until used. If the milk is produced in a cleanly manner and immediately cooled and kept at a temperature of 45 F., it should not contain more than 2500 to 10 000 bacteria per cc., at the end of twenty-four hours. This is shown by the following experiments. The results are an average of five experiments.

Immediately after milking the samples were cooled to 50 F., and kept at that temperature:

Age.	Bacteria per cc.
0	3 890
3 hours	3 280
6 hours	3 000
9 hours	2 740
12 hours	3 800
24 hours	8 400

One of these samples contained colon bacilli; these, however, apparently disappeared at the end of nine hours, as they were not found in any of the specimens examined after that time.

An enormous increase in the number of bacteria occurs during the time it is allowed to stand on the station platform without any protection, and also during shipment to the City.

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If milk be properly iced, the number of bacteria steadily decreases during the first fifteen hours. After twenty-four hours milk at a temperature of 70 F. becomes strongly acid and soon curdles. In fact, the number of bacteria and the acidity show a marked increase after twelve hours.

Culture Media.

In response to the many requests as to how the DEPARTMENT prepares the culture medium used for the Diphtheria outfits, the following method, which has been in use for several years, is submitted:

The blood used is ox blood, collected in a sterile earthen jar, in as aseptic manner as possible, about four liters in a jar. To this is added 100 cc. of sterile water to partly lake the corpuscles and dissolve some of the hemoglobin. The hemoglobin is necessary for the growth of the Influenza bacilli. The jar is set aside in an ice box for 48 hours to allow the serum to separate.

The serum is now drawn off into a separatory funnel and one-tenth its volume of a concentrated glucose bouillon is added. This bouillon is made of fresh veal and is ten times the strength of ordinary bouillon.

The media is then drawn off into aluminum boxes previously cleaned and sterilized. About five cc. are drawn off in each box, which is carefully covered and placed on a tray in a hot water oven. The gas is then lighted and the temperature of the oven is gradually brought to 85 degrees Centigrade, then allowed to cool. The next day it is again heated as before, and on the third day the serum is heated until solidified, which requires about three hours, the temperature being raised to 100 degrees. This leaves the serum almost transparent.

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The boxes are taken from the oven and while still hot are sealed with rubber bands. If adhesive plaster be used instead of rubber bands the serum will remain moist and sterile, in a cool place, for a year.

An Improved Centrifuge.

The centrifuge now used in the HEALTH DEPARTMENT Laboratories for fat determinations of milk according to the Babcock method, was especially constructed after drawings furnished by the DEPARTMENT. This machine embodies several new and original ideas of proven value. It is an extra large machine, being arranged for forty bottles. The motive power is furnished by a vertical electric motor which is attached directly to the shaft of the centrifuge on which rests the tester head carrying the testing bottles. By this direct attachment, any gearing which a horizontal motor would require is omitted, and thus all jarring which would tend to spoil the ball bearing carrying the tester head, is avoided. The rattling noise which would accompany the operation of the gearing of a horizontal motor is likewise avoided. This centrifuge is practically noiseless; only the whirring of the bottles through the air can be heard. While electric motors have been used occasionally for milk testing centrifuges, they have been horizontal motors, and the operation of those machines was noisy and the bearings wore out rapidly in consequence of the jarring.

Another feature of the machine in the HEALTH DEPARTMENT Laboratories is the employment of steam, not for the purpose of turning the machine the direct way as has been done hitherto, but for the purpose of stopping it when put into motion by the electric motor. The steam is applied to the machine in the same direction in which it would be applied if the machine were to be driven by steam the

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ordinary way. The motor is so connected that it turns the machine in the direction opposite to that of the steam. In this way, the steam appliances of the machine, which was originally devised to be driven by steam only, there being no electrical machines ready made in the market, could be left in their original condition. The steam brake created by using the steam in the direction opposite to that of the electric power is much more satisfactory than mechanical brakes such as have been used hitherto, because it stops the machine gently and gradually, and not by a violent jar on some part of the rotating tester head, as is the case with mechanical brakes.

In order to prevent the exhaust steam from passing into the atmosphere of the Laboratory, it is condensed by injection of cold water into a cylindrical chamber which receives the exhaust steam. The steam is also used to heat the chamber of the machine containing the testing bottles so as to prevent solidification or excessive cooling down of the butter fat. The steam going into this chamber is first passed upward through a comparatively wide pipe so as to be deprived of most of the condensation it may carry. The rest of the condensation is taken away just before the steam enters the chamber, by a small branch pipe passing downward and connecting with the sewer. Thus the steam that enters the chamber is rendered dry or nearly so. Any steam which may condense in the chamber is carried off by a small drain pipe. Thus the bottles in the chamber are kept warm by dry steam without any accumulation of water of condensation in the chamber.

It is a well-known fact that in an ordinary steam-driven machine having a closed chamber, the bottles in the chamber frequently get so hot that they cannot be touched by the hands, thereby causing delay in the work. This does not

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happen with the machine in the HEALTH DEPARTMENT Laboratory, as the temperature can easily be controlled by regulating the amount of steam admitted to the chamber.

The steam is also used for heating the water which is put into the testing bottles, by passing it through a branch pipe into a small water boiler in the usual manner.

Another feature of this machine is an additional door affording access to the chamber on the side opposite the door where the bottles are taken in and out. While the second door does not seem to have ever been attached to any machine of this kind hitherto, it is quite necessary on certain occasions. For instance, if a bottle breaks in the chamber, an occurrence which is not uncommon, when new bottles are used, it is quite difficult to remove the acid and broken glass on the side opposite the door, if there is but one door, more especially when the chamber is full of bottles. The second door makes the neutralization of spilled acid and the removal of broken glass a much easier task.

These new features insure, besides accurate testing, an easy and noiseless operation of the machine and avoid the passing of annoying water vapors into the air of the Laboratory, preventing unnecessary jarring and wearing of the tester head, and can be obtained by only a slight modification of the ordinary steam-driven machine.

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DAIRY INSPECTION.

IN its effort to improve the milk supply of the city the DEPARTMENT realized that no amount of care, pasteurization or sanitation in the city could save a milk that had been produced in an uncleanly manner or become contaminated on the farm.

Therefore, a campaign of education and enlightenment among the dairymen who supply the city with milk was begun in 1904 through the dairy inspectors. These men were given special instruction in sanitary dairying and were to impress the need and advantages to be gained from the same upon the dairymen whom they visited.

The enforcement of sanitary regulations on the farm or dairy is a problem of no mean proportions, as most of the dairies supplying the milk to Chicago are outside of the city and a majority outside of the State. They are, therefore, beyond the jurisdiction of the city.

The methods pursued were at first educational, and the DEPARTMENT promised and extended its aid in enforcing such regulations in the city among the milk dealers, as were requested by the dairymen. Whenever possible the DEPARTMENT, through its milk inspectors, required the milk dealers in the city to return the shippers' cans clean and dry, within forty-eight hours. This was a great help to the dairyman, as, when his cans were returned clean and dry he did not have to spend hours scouring and cleaning them, and he had less sour milk returned to him because, unless the cans are thoroughly cleaned, the milk put into them sours very readily.

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In many cases, however, other methods were required to secure proper sanitation of the dairy. In these cases notice is given that unless the regulations of the DEPARTMENT are complied with the milk will be refused entrance to the city, and either returned or dumped. One inspector is constantly employed at the receiving platforms in the city, to return or destroy the milk from such dairies as do not comply with the regulations of the DEPARTMENT. He has returned or destroyed 1804 eight-gallon cans of milk during 1906.

This always accomplished the desired result, and enables the enforcement of sanitary regulations even in dairies in other States.

Every dairy shipping milk to Chicago within a radius of 115 miles—beyond this distance no milk is shipped here because of the freight cost—is now inspected every month. All milk from dairies that do not pass inspection—as to sanitary condition, health of herds, methods of feeding, milking and handling—is excluded from the Chicago market until subsequent inspection shows remedy of defects.

The DEPARTMENT has received a great deal of assistance from most of the large dairies and bottling plants. The progressive dairyman welcomes all suggestions whereby his plant may be improved. It is with the ignorant dairy farmer that the inspectors find their greatest trouble. Against these men coercive powers must be employed. The milk from these farms, if mixed with that from others that comply with the regulations, would contaminate the whole, and thus thwart the entire work of the DEPARTMENT.

Inspectors' Visits.

The dairy inspectors visit each farm or dairy that ships milk to the city and fill out the following blank form, which is then filed in the Laboratories as a permanent record.

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H. D. 188.

CITY OF CHICAGO

DEPARTMENT OF HEALTH

DIVISION OF DAIRY INSPECTION

Owner of dairy _____ P. O Address _____

Name of Consignee _____ Address _____

City platform _____ Country platform _____

Shipments via _____ Ry. Number cans shipped daily _____

Number acres in farm _____ Sanitary condition of farm _____ Source of water supply _____

Sanitary condition of barn _____ Size of barn _____ Is barn properly lighted and ventilated _____

Kind of barn floor _____ Is barn whitewashed _____ Number of stalls in barn _____

Sanitary condition of milk house _____ How far is milk house from the barnyard _____ Is there running water in milk house _____ Is there an open can rack _____

Number of cows in herd _____ Number in good condition _____ Number in fair condition _____ Number sick or diseased _____

Are the cows clean _____ Are the udders washed _____ Is the milking done cleanly _____

Are the utensils properly cleaned _____ Is the milk properly strained _____

Is the milk properly cooled _____ Is the milk properly aerated _____

Is the milk carried on spring-wagon _____ Are the milk cans covered by canvas _____

Are the cows fed wet malt _____ Are the cows fed ensilage _____

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If any violation of the DEPARTMENT'S rules is noted the owner of the dairy is requested to remedy the same and a reinspection is then made within one week; if the instructions have not been complied with the milk is returned or destroyed until it is remedied.

Sanitary Conditions.

At each dairy visited the sanitary conditions are carefully noted. Proper drainage and extreme cleanliness in all particulars is demanded. The cow stables must be whitewashed and must have proper light and ventilation. Especial attention is also paid to the milk-house. It must be clean, dry, well ventilated, and contain nothing not absolutely necessary in the handling of the milk. All cans and utensils must be clean and dry. If any diseased animals are found among the herd, they must be isolated or killed, and under no circumstances can the milk from such animals be used.

Wet Malt Feed.

The one thing required besides cleanliness is that no "wet malt," "vinegar slops" or "beet pulp" be fed to milch cows.

The first year's work showed that 19 per cent of the dairies shipping milk to Chicago were feeding "wet malt" to the cows. Out of 61 030 cows inspected in that year nearly every case of sickness—from anthrax, tuberculosis, actinomycosis, to the milder affections—was found in herds fed upon "wet malt".

This fact, which was noted early in the inspection work, led to a series of bacteriologic examinations by the Director of the Laboratories, Dr. J. F. Biehn, the results of which showed an enormous preponderance of the peptonizing and putrefactive organisms in the milk of cows fed on such material.

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It was demonstrated that it is owing to the presence of these organisms that such milk does not sour, but putrefies in a short time, with a vile odor, and it was added that—

> No amount of Pasteurizing will make such milk wholesome, because the toxins or poisons produced by these organisms are not affected by the Pasteurizing temperature.
>
> When fed to the young this milk causes marasmus, or "wasting", infantile diarrhoea, dysentery and all the symptoms of chronic ptomain poisoning.

A vigorous warfare was begun against "wet malt" feeding, and milk from dairies where such material was fed was excluded from the city until the owner filed an affidavit with the DEPARTMENT to the effect that so long as he shipped milk to Chicago he would not feed any such material to his cows. The first year 2857 dairies were inspected, and 19 per cent were feeding "wet malt"; in 1905, 3146 dairies were inspected, and 8 per cent were feeding "wet malt"; in 1906, 4029 dairies were inspected, and only a little over 3 per cent were feeding such food—thus this objectionable practice is nearly stamped out.

Legal Action—Department Sustained.

When the crusade against "wet malt" was started, determined opposition by powerful interests at once developed; injunctions against the DEPARTMENT were sought, prosecutions of the violators were resisted, and finally one offender, who had been fined by the Criminal Court, backed by these same interests, appealed his case.

The Appellate Court of Cook County handed down the following decision, in which the action of the Criminal Court is sustained, the validity of the ordinance is sweepingly

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affirmed, and the exercise by the DEPARTMENT OF HEALTH of the police power for the protection of health against impure, unwholesome or poisonous food products, is upheld:

AT A TERM OF THE APPELLATE COURT, Begun and held at Chicago, on Tuesday, the second day of October, in the year of our Lord One Thousand Nine Hundred and Six, within and for the First District of the State of Illinois.

Present, Hon. EDWARD O. BROWN, Presiding Justice.
" Hon. JESSE HOLDOM, Justice.
" Hon. FRANCIS ADAMS, Justice.

ALFRED R. PORTER, Clerk. THOMAS E. BARRETT, Sheriff.

BE IT REMEMBERED, That on the eighth day of October, A. D. 1906, there was filed in the office of the Clerk of said Court an opinion of said Court, in the words and figure, following, to-wit:

JOHN RINGELSTEIN, Appellant, } Appeal, Cook Criminal.
No. 12722 vs.
CITY OF CHICAGO, Appellee. } Error to Cook.

MR. JUSTICE HOLDOM DELIVERED THE OPINION OF THE COURT.

John Ringelstein, appellant, was convicted and fined twenty-five dollars in the Criminal Court of Cook County for a violation of Section 964 of the Municipal Code of Chicago, which provides:

"No person or persons, firm or corporation, shall keep or have in his or her possession any slops or refuse of any distillery, brewery or vinegar factory, or any similar slops, mash or refuse, or food that has been subject to fermentation, for the purpose of feeding the same to any milch cow or cows. Each day's failure to comply with this section shall subject the offender to a fine of not less than twenty-five dollars."

It is admitted in the record by appellant that the article made contraband by the provision of the code cited was

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found upon the premises of appellant and used for food for milch cows there kept by him.

There is no dispute about the facts. The questions raised are ones of law only. Appellant contends that Section 964 *supra* is unconstitutional in that it deprives appellant of his right of property, without due process of law. If this provision of the Municipal Code can be sustained, it must find its support in the exercise of the police power in furtherance of the public health and the protection of the citizen against disease.

The City Council had authority to pass the ordinance in question:

First: By the express authority conferred by Subdn. 66, Sec. 1, Art. 5, Chapter 24, R. S.—Starr & Curtis—which provides, "The City Council shall have power. . .to. . .pass and enforce all necessary police ordinances," and by Subdn. 78 *supra* "to do all acts, make all regulations which may be necessary or expedient for the promotion of health or the suppression of disease."

Second: Without such express power the Common Council have the right by implication to pass such an ordinance in the exercise of the police power.

As said in Gundling v. City of Chicago, 176, Ill., 340, "The preservation of the public health being indispensable to the existence of a municipal corporation, the power to enact ordinances to that end is inherent in a municipality," and as also said by the Supreme Court of Minnesota in State v. Nelson, 66 Minn., 166, "any police regulations that did not provide means for insuring the wholesomeness of milk . . .for sale and consumption would furnish very inadequate protection to the lives and health of the citizens."

By the common law it is axiomatic the duty of government to conserve the public health. 1 Black Com. 132 & 133, Sharswood's Edn., "The preservation of health is one of the paramount objects of government. It belongs to the police power. . .subject to the proper exercise of which either by the State legislature directly or by public corporations, to which the legislature may delegate it, every citizen holds his property."

Dillon on Municipal Corp'ns., Sec. 93.

It is a fact of common knowledge that the keeping of cows in cramped and narrow quarters in a densely populated municipality, without the opportunity of open air exercise, impoverishes the quality of the milk of cows so kept, and

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when to this detrimental environment is added the deprivation of nature's food, gathered from green pastures, upon which their kind have been pastured from earliest recorded time, and unwholesome swill and slops fermented in vinegar factories and breweries are fed to cows so kept, it becomes evident that the product of cows so fed and housed is more than liable to be unfit for human consumption, and milk from such animals especially unfit for young children, and as said in Johnson v. Simonton, 43 Cal., 242, "If it indeed be a fact that the milk of cows fed in whole or in part upon still slops is unwholesome as human food, there can be no doubt of either the authority or duty of the board to enact the ordinance in question." The validity of an ordinance—akin to the one now before this Court for constitutional interpretation—of the City of San Francisco was challenged in Johnson v. Simonton *supra*.

Appellant challenges the reasonableness of this ordinance, contending that whether or not it is reasonable is a question of fact and not of law and that the evidence received when considered together with evidence proffered and erroneously rejected against appellant's objection, establishes the unreasonableness of the ordinance.

As the presumptions of the law are in favor of the reasonableness of the ordinance, these presumptions to be overcome must be rebutted by the proofs—or the ordinance upon its face must clearly appear to be unreasonable, before the Court is authorized to interpose its authority in holding such ordinance to be void as unreasonable. In People ex rel. v. Cregier, 138 Ill., 401, the Court said: "It is therefore incumbent upon any one who seeks to have them" (the ordinances) "set aside as unreasonable to point out or show affirmatively wherein such unreasonableness consists."

In substance the record shows, on the testimony of appellant, that appellant keeps continuously about sixteen cows stabled in a barn thirty-three feet long by twenty feet wide. without bedding of any kind, and that he feeds them on vinegar slops and keeps each cow in this way about eight or nine months, without exercise. Merrillat, a veterinary surgeon, admits that want of exercise is detrimental to the health of the animals, while Delafontaine testifying on the part of appellant states "that there is nothing inherently harmful in vinegar slops as a food for milch cows," yet on cross examination he admits that vinegar slops will ferment and putrify upon exposure to the air in sufficient warmth and not too much light, that there are then present various products more or less poisonous, including toxines. On the

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part of the City, Doctor Joseph F. Biehn testifies that poisons of various natures, including ptomain, are found in milk from cattle fed on vinegar slops, that such is injurious to the health of people who drink it, producing intestinal diarrhœa in young children, that an examination of milk taken from cows fed on vinegar slops developed the fact that it was not wholesome. This testimony, of itself, abundantly establishes both the reasonableness of the ordinance and its necessity and that the product of appellant's cows is injurious to health and provocative of acute disease.

In La Hote v. New Orleans, 177 U. S., 587, on p. 589, the Federal Supreme Court adopted in its opinion the dicta of Dillon on Municipal Corp'n, Sec. 141, that "Laws and Ordinances relating to the comfort, health, convenience, good order and general welfare of the inhabitants are comprehensively styled 'Police laws or regulations.' It is well settled that laws and regulations of this character, though they may disturb the enjoyment of individual rights, are not unconstitutional."

It was well said in Gundling v. City of Chicago, *supra*, p. 348-9: "The regulation of the police power is hardly susceptible of exact definition, as the exigencies of each case are varying and the cases are innumerable where the health of the inhabitants of the municipality may be in some degree endangered. When the City Council considers some occupation or thing dangerous to the health of the community, and in the exercise of its discretion passes an ordinance to prevent such a danger, it is the policy of the law to favor such legislation as being humane and essential to the preservation and protection of the community. Municipalities are allowed a greater degree of liberty of legislation in this direction than any other. The necessity for action is often more urgent and the consequences of neglect are more detrimental to the public good in this than any other form of local evil."

People v. Bowen, 74 N. Y. Rep., 489, cited by counsel in support of his contention, on consideration appears to us to have quite the contrary effect. Bowen was dealt with and fined in the sum of one hundred dollars for violating Sec. 12, as amended, of the agricultural law of the State of New York, being similar to the ordinance here in question. While the judgment was reversed, it was for error of fact and lack of proof of a fact made essential of proof by the People to warrant Bowen's being disciplined under Sec. 12, *supra*, which he was charged with violating. The whole subject of the constitutionality of Section 12, *supra*, as

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amended was both argued and passed upon by the Court, and while Mr. Justice Werner filed an exhaustive dissenting opinion in which Mr. Justice Haight concurred, the whole bench of the Court of Appeals unanimously held that the law under which Bowen was prosecuted was constitutional "as a proper exercise of the police power in order to prevent fraud and preserve health," see p. 492.

Exhibits A and B, offered by appellant and excluded by the Court, are of the same character of evidence as the report of the board of health held to constitute hearsay evidence in City of Montezuma v. Minor, 73 Ga., 484, and inimical to the same objection. The ordinance of the City of Chicago regulating the keeping and feeding of cows in question is clearly an exercise of the police power by the Common Council delegated to it by the express words of the statute *supra*, and valid and binding as a law of that municipality, and is in no respect violative of any provision of the organic law, State or Federal. It is an ordinance necessary for the preservation of the health of the people and to guard against disease.

The Criminal Court is guiltless of error in its judgment and its judgment is therefore affirmed.

Affirmed.

I, ALFRED R. PORTER, Clerk of the Appellate Court, in and for the First District of the State of Illinois, DO HEREBY CERTIFY, That the foregoing is a true copy of the opinion of the said Appellate Court in said cause, as appears of record in my office.

IN TESTIMONY WHEREOF, I have set my hand and affixed the seal of the said Appellate Court, at Chicago, this thirteenth day of October in the year of our Lord one thousand nine hundred and six.

[SEAL] ALFRED R. PORTER,
Clerk of the Appellate Court of the First District.

To stop the feeding of "wet malt" has been one of the hardest tasks of the DEPARTMENT, because of the economic problem involved. However, a great number of dairymen who have been compelled to use better foods have come to realize their superiority over malt, and will undoubtedly give them preference in the future.

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Thus dairy inspection, by its beneficial effects at the place of production, coupled with the rigid milk inspection carried on in the city, has insured for Chicago a milk supply with which any city might well be satisfied.

Dairy Farms Inspected.

LIST OF FARMS ON THE FOLLOWING RAILROADS INSPECTED IN 1906:

Chicago & North-Western R. R.	916
Chicago, Milwaukee & St. Paul R. R.	777
Wisconsin Central R. R.	430
Chicago, Burlington & Quincy R. R.	369
Illinois Central R. R.	323
Chicago Great Western R. R.	297
P., C., C. & St. L. R. R.	150
Baltimore & Ohio R. R.	140
Chicago & Aurora Electric	109
Rock Island R. R.	100
Sante Fe	100
Wabash	61
Belt Line R. R.	48
Chicago & Eastern Illinois R. R.	47
Chicago & Alton R. R.	40
Grand Trunk R. R.	40
By wagon	82
	4029

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BUREAU OF MILK INSPECTION.

MILK inspection is one of the most important of the various branches of the HEALTH DEPARTMENT; adulteration of milk and its prevention has in comparatively recent years become a question of such vital interest to those charged with the care for the health and well-being of the public in the large centers of population, that our Bureau of Milk Inspection has long outlived the time when it needed a defense to justify its existence. Thirteen years ago Chicago began a systematic and scientific inspection and examination of the milk supply, an humble beginning with four inspectors. In those days it was in its experimental stage, requiring a defense; to-day its importance is so generally conceded that proper milk inspection is now recognized as a necessity.

It is well known, and overwhelmingly proven by statistics, that in impure or adulterated milk lurk the germs spreading grave diseases and death for tender constitutions; that, on the other hand, the pure, sweet, unadulterated milk product means health, strength—aye, life itself to the numberless thousands, especially infants to whom sweet cow milk is often the only substitute for mother's milk, and their sole sustenance during their tenderest period of existence.

Inspection vs. Infant Mortality.

Surprising, indeed, to the casual observer, and proof positive of the indispensability of a pure milk supply, is the inter-relation existing between the quality of the milk, the milk inspection and the infant mortality in our big cities; it may be summarized into the axiomatic rule: The more rigid

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the inspection the better the quality of the milk put up for sale and the smaller the percentage of the infant mortality; the laxer the inspection the poorer and unwholesomer the quality of the milk and the greater the percentage of the infant mortality. Statistics, with mathematical certainty, prove this to be a fact.

Additional Inspectors.

During the year which is now closing, the growing importance of this branch of the service has found expression in a substantial increase of the appropriation for the Bureau of Milk Inspection, and in the appointment of four additional inspectors, which gives the city now a total of eleven inspectors, forming a staff of well-trained and thoroughly efficient men, whose conscientious devotion to their duties has been fruitful of highly gratifying results. Such results could not be attained without a corps of capable and trustworthy inspectors, who begin their day's work as early as 3 A. M. during the time from April 1st to November 1st, awaiting the incoming milk trains, entering depots and stores, stopping wagons in the open street to take samples, inspecting the sanitary conditions and assisting in the prosecution of law-breakers.

Rules and Methods.

The rules of the Bureau of Milk Inspection are very stringent; they require inspections to be made vigilantly every week day, frequently even on Sundays, and the visitations to be as irregular as they are sudden, the same party sometimes being visited on consecutive days and always at irregular intervals; and as each inspector is assigned to a separate district for which he is held accountable, the efficiency of each man on the staff can be gauged with great accuracy.

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As the samples gathered in by the inspectors for the milk tester are recorded and made known to the chemist only by numbers, all possibility of favoritism and collusion is thereby excluded.

Such watchfulness, when followed up by relentless prosecution, and heavy fines, makes milk adulteration in course of time an expensive experiment, and as it soon ceases to be profitable, it brings conviction home that in the milk trade, as elsewhere, "honesty is the best policy."

The Bureau of Milk Inspection has accomplished so much that the quality of the milk supplies for Chicago compares very favorably with that of any of the other large centers of population in the United States, and, with persevering vigilance, we hope for the future to reduce milk adulteration in Chicago to the lowest possible minimum, if not to suppress it altogether.

It is to be hoped that ere long it will be recognized that a thorough milk inspection such as we now have, will be accorded its place in the front rank of preventative medicine; the noble aim and triumph of the medical profession of our day—not so much to cure as to prevent disease.

Each inspector is provided with a horse and buggy, a sample case that holds twenty-four half-pint bottles, and a long-handled dipper to stir the milk before taking a sample. The sample bottles are cleaned and steam sterilized every day before using, and a numbered gummed label is then affixed to each. The samples are designated by number only during their analysis in the Laboratories.

When the inspector takes a sample he fills out the following blank:

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Insp. _____ Date _____ 190____

Name _____ Address _____

Attendant _____ No. of Wagon _____ License No. _____

Where taken _____ Sanitary Division No. _____

Remarks: _____ Time _____

Laboratory Number	Sample of	Marks on Can	Size of Can	Approx. Amt. in Can	Dup. Given	Spec. Gravity	Butter Fat	Total Solids	RESULT OF ANALYSIS

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The following table gives in detail the work accomplished by the dairy inspectors:

	1904	1905	1906
Dairies inspected	2 857	3 146	4 029
Cows inspected	61 030	68 331	79 681
Eight gal. shipped per day	12 074	14 789	20 012
Barns, ventilated	828	1 347	3 468
" not ventilated	2 042	1 845	550
" whitewashed	248	765	2 993
" not whitewashed	2 605	2 464	987
" wooden floors	2 433	2 668	3 165
" cement floors	211	286	495
" no floors	167	171	96
Good wells	2 683	3 050	3 617
Spring water	276	328	279
Feeding malt	544	249	143
Cleanly milking	2 128	2 660	2 711
Dirty milking	641	422	167
Milk cooled	2 597	2 958	3 874
" aerated	731	836	3 500
" strained	2 730	3 071	3 927
Herds, good condition	2 476	2 643	3 282
" fair "	317	468	636
" bad "	51	40	89
Farms, good sanitation	2 318	2 382	2 645
" fair "	426	678	1 213
" bad "	112	86	110
Milk houses, good sanitation	2 264	2 917	3 147
" " bad "	362	179	784
Diseased cows killed	.....	39	104
Cans of milk dumped	.....	929	1 804

The following table gives the number of milk samples taken and the per cent below grade by months, for the years 1903, 1904, 1905 and 1906:

Months.	1903		1904		1905		1906	
	Samples	Below Grade	Samples	Below Grade	Samples	Below Grade	Samples	Below Grade
		per cent		per cent		per cent		per cent
January	1 674	5.70	1 802	6.80	2 046	8.00	2 331	5.8
February	1 463	3.90	1 719	6.60	1 682	7.10	2 880	8.1
March	1 574	6.30	1 426	6.00	3 376	6.04	3 209	5.8
April	1 853	4.90	2 842	4.30	2 591	7.02	3 614	5.5
May	1 969	6.50	2 056	5.60	2 484	4.06	4 612	4.1
June	1 692	6.20	2 301	8.30	2 090	5 50	4 627	6.6
July	2 165	5.60	1 474	3.50	2 047	6.60	5 447	8.8
August	3 128	5.10	2 344	7.20	2 001	5.70	5 430	9.8
September	3 238	5.20	1 806	5.20	1 271	3.80	4 528	9.6
October	2 542	4.90	1 647	6.90	1 397	2.07	4 945	6.5
November	2 432	7.20	3 180	7.20	2 258	6.03	4 800	6.7
December	2 186	8.40	2 646	8.00	2 484	5.80	4 516	8.6
Totals	24 926	5.82	25 243	6.30	25 727	5.80	50 939	7.1

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A METHOD FOR THE ESTIMATION OF FAT IN THE PRESENCE OF CANE SUGAR.

THE increased number of samples of condensed milk and the crusade on ice cream this year brought into prominence a problem heretofore of little practical importance in the HEALTH DEPARTMENT Laboratory. Some quick accurate method of estimating the percentage of butter fat in sweetened products of milk must be found. The Babcock centrifugal method of fat determination, which with unsweetened milk and cream gives a clear sharply defined column of fat in the neck of the test bottle, gives, in the presence of even a slight amount of cane sugar, a black mass in which the fat is completely hidden. The explanation is simple. The strong sulphuric acid which is added to the sample as one step in the test chars the cane sugar, giving an insoluble mass lighter than water. This is thrown up into the neck of the bottle together with the fat, which is also lighter than water, by the centrifugal force, when the bottles are whirled in the second step in the test. To avoid this trouble either of two principles have heretofore been used.

First, abstract the sugar and make the regular test on the residue; and, second, abstract the fat and weigh directly.

Leach advised the removal of the sugar and described a method for doing it. A few trials by Mr. Holm, Assistant Chemist, convinced him that this was a tedious and not altogether satisfactory way.

Of the methods using the second principle, the Adams continuous extraction with ether and the Warner-Smith

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method with immiscible solvents were objectionable, as they were inaccurate as well as lengthy. So a method of our own devising was perfected.

New Acid Test for Milk Fats.

Some work had been done on it a year ago, but most of the details are results of this year's experience. As now carried out the test is very simple. Nine grams (instead of 18 as in the Babcock test) of the sample are weighed into a milk testing bottle, which is then filled almost to the neck with a mixture of equal parts of strong hydrochloric acid and glacial acetic acid. This is heated until just black and the bottle whirled in the centrifuge, with the addition of water to bring the fat within the graduations on the neck of the bottle. The resulting fat column is read from markings on the bottle. This reading doubled gives the percentage of butter fat in the original sample.

At first only 6 gr. of the sample were used, but repeated trials showed that 9 gr. gave as clear readings and had two distinct advantages. The scales and weights used for weighing the cream samples also served here, thus making extra weights unnecessary, and also any error in reading was only doubled instead of tripled, as was the case if 6 gr. were used. In weighing ice cream and almost all condensed milks, they were drawn up into the regular pipette and blown directly into the bottle until the required amount had been delivered. In a few cases with thick condensed milk, this could not be done, so the sample was weighed dissolved in the acid in a glass beaker and the final resulting solution poured into the test tube. This added a little to the time required for the test, but seems unavoidable.

The acid mixture used has never been tried before, as far as is known. Hydrochloric acid alone chars the sample on

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heating almost as badly as sulphuric acid, and, therefore, is useless. Acetic acid alone will not dissolve the milk solids, but the mixture works perfectly. Various proportions of the two acids were tried until it was seen that equal parts of each gave the best results. The mixture is made up in quantities and used as needed. The amount for each sample need not be measured exactly. Experiments proved that the filling of the bottle as full as possible and still leaving room to shake the contents, saved time and gave good results. This means practically 17 cc. of each acid. In this, as in all cases where hydrochloric acid is used, even with normal milk, heating must be resorted to in order to completely dissolve the proteids, but must not be continued after the sample becomes black or charring will result.

A hot water or steam bath is the best method of applying the heat. The heated sample is then placed in the centrifuge with the regular samples and treated exactly as an ordinary milk sample, except that the fat reading is doubled. The special treatment takes about five minutes. Strong sulphuric acid may be used in place of the hydrochloric acid and all the other details carried out just the same, except that the heating is not required. The only objection is that the action of the acid mixture on the proteids and cane sugar is not so well under control as when the hydrochloric acid is used.

In actual practice the method as described takes very little time, as other work is done while the heating is going on. When a number of special samples are run through at the same time, very quick work is possible. Twelve samples have been completed in half an hour.

To prove the accuracy of the test, the results of 24 ice cream samples were compared with the results on the same samples tested according to the directions given by Leach

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and carried out by Mr. Holm. In all cases the differences were so small as to be charged to the difference in manner of reading the results as practiced by Mr. Holm and myself.

As a further proof, unsweetened milks and creams, having fat contents ranging from 2 per cent to 20 per cent, were tested by our method and also by the Babcock centrifuge method, and the results practically agreed.

For our purpose this gives an almost ideal test, as it is accurate and yet requires very little time, while only such chemicals as are always in the Laboratory and no extra apparatus are necessary.

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SPECIAL PAPERS FROM THE LABORATORIES.

CHEMICAL ANALYSIS OF MILK.

By M. L. HOLM, Ph. G., Ph. C.

HEHNER'S TEST FOR FORMALDEHYD.

By M. L. HOLM, Ph. G., Ph. C.

DETECTION OF BORIC ACID IN MILK.

By FRANCIS J. SEITER, Sc. B., Assistant Chemist.

IDENTIFICATION OF COCAIN AND SOME COCAIN SUBSTITUTES.

By FRANCIS J. SEITER, Sc. B., and FREDERIC FENGER, Ph. D.

SANITARY WATER ANALYSIS.

By FREDERICK O. TONNEY, A. B., First Ass't Chemist.

FOOD INSPECTION.

By P. J. MURRAY, Chief Food Inspector.

SANITARY CONDITION OF CITY WATER DURING THE YEAR 1906.

HUGO JONE, Sc.B., Chief Chemist.

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CHEMICAL ANALYSIS OF MILK AT THE LABORATORY OF CHICAGO HEALTH DEPARTMENT.

M. L. HOLM, PH. G., PH. C.

WHILE the analysis of milk is perhaps the simplest branch of food chemistry, it is nevertheless one of the most important from the standpoint of the public. There is no other food product so extensively used. A large number of children and even adults at times derive their entire nutrition from this product. It furnishes the various nutrients of the body, perfectly proportioned and easily assimilated.

The fraudulent practices of unscrupulous milk dealers present themselves to the chemist practically in one or more of three phases, viz: Watering, skimming and chemical preservation.

Of these watering is perhaps the most common. The average per cent of water in normal milk is about 87-87.5. While it is well known that this may vary with individual cows, as well as having seasonal variations,* when the mixed milk from a herd of cows contains above 88 per cent water it should be regarded with extreme suspicion.

Skimming is a fraud very commonly practiced by milk dealers. It is impossible to estimate with any degree of accuracy just how much this fraud is practiced, because of the wide variation of the fat per cent in the milk of different breeds of cows. While the butter fat in an average milk will be about 4 per cent, there are certain breeds of cows which give uniformly less, for which reason 3 per cent has been made the legal standard of the City.

*Seasonal variations in composition of cow's milk, by H. C. Sherman, Journal of American Chemical Society, December, 1906.

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Chemical preservation, I am pleased to say, is not much resorted to by the dealers of Chicago. Formalin is practically the only one employed and this only to a limited extent. A few cases have occurred in which borax, boric acid, bicarbonate of soda or peroxide of hydrogen were used. Salicylates and benzoates, while much used in other articles of food, have never been found by us in milk.

Concerning the use of chemical preservatives, much may be said. Volumes have been written pro and con. All agree, however, that if milk be collected and handled with proper regard for cleanliness and other sanitary considerations, preservatives are at least unnecessary. The very purpose of a preservative is to destroy life or to prevent its free growth and development. Any agent which accomplishes this purpose can certainly exert no beneficial effect upon the health of the many infants and invalids whose sole diet consists of milk.

Following is a brief resume of the routine analysis of milk, skimmed milk and cream as conducted in the Laboratories of Chicago DEPARTMENT OF HEALTH.

Samples are collected each morning by the various milk inspectors, being taken, in part, from the receiving platforms at the various railway stations (such samples are known as shippers' samples), but chiefly from milk wagons, stores, restaurants, etc., where the milk is sold directly to the consumer. Each sample is numbered and a memorandum bearing the same number gives the dealer's name, the date, hour, condition and capacity and contents of receptacle, etc., from which the milk was taken. The samples are then brought, with the least possible delay, to the Laboratories, and placed by the inspector in a locked compartment of an ice chest. Only the inspector and the milk tester have keys to each such compartment. Thus all samples are tested and

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reported exclusively by number, the testers being at all times ignorant as to the ownership of the lot from which the samples were taken.

The preliminary examination is made by the milk testers, and is conducted as follows:

1. After thorough mixing by pouring from one bottle to another, the specific gravity of the sample is taken with the Quevenne lactometer.

2. The percentage of butter fat is determined by placing 17.6 cc. in an ordinary Babcock bottle; then running in equal volume of commercial sulphuric acid. The acid and milk are thoroughly mixed by rotating the bottle between the fingers. The bottles are then placed in a centrifuge and whirled at a speed of about 800 revolutions per minute for ten minutes. Hot water is then run into each bottle to within about three-fourths of an inch of the top. The bottles are again whirled for five minutes, after which the percentage of fat which has collected in the calibrated neck of the bottle is read and recorded.

3. Total solids and *solids not fat* are estimated according to the coefficient of Hehner and Richmond.

4. Formalin gives a characteristic purple color with the commercial sulphuric acid employed in making the Babcock test, and this may readily be observed at the time the acid is added. Concerning the reliability of this test for formalin, I may say that many thousand milk samples have been separately tested in the City Laboratory for this and other preservatives, but in no case has formalin ever been known to escape the trained eye of our milk tester, and I believe that any experienced man will invariably detect formalin while adding the acid in the Babcock test, if any be present.

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[illegible] water added and the [illegible] it has also been found that [illegible] in each bottle before [illegible] separation of the fat is effected. [illegible] The total analytic data are then [illegible] for this purpose and delivered [illegible], which identifies the samples by [illegible] under the name of the dealer.

[illegible] and specific gravity

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The DEPARTMENT also analyzes, free of charge, any sample of milk or milk product delivered to the office by the public. This not only enables the public to aid us in securing for the city an honest milk business, but permits the small as well as the large dealer to obtain an accurate and authoritative analysis of the product furnished to him by his shipper as often as he may deem necessary for the protection of himself and his customers.

The following figures show the daily shipments of milk and cream, in 8-gallon cans, into the City of Chicago, over the various lines of railroads.

RAILROADS	1898	1899	1900	1901	1902	1903	1904	1905	1906
C. & N.-W.....	5 400	5 400	6 000	6 500	8 500	9 000	10 000	10 000	11 000
C. M. & St. P.....	2 600	2 660	3 500	4 000	5 500	5 500	6 500	6 600	6 500
Illinois Central....	1 500	1 550	1 500	1 900	2 300	2 300	2 500	2 600	2 600
C. G. W.....	1 600	1 600	1 200	1 550	1 700	1 700	1 800	1 800	1 700
Wis. Central.....	800	800	700	1 000	1 000	1 000	1 000	1 600	1 800
C. B. & Q.....	800	800	700	900	950	1 000	1 000	1 100	1 000
A. T. & S. F.....	550	550	500	600	650	600	600	600	600
Grand Trunk.....	450	450	400	500	500	500	500	550	500
Rock Island	450	450	500	700	600	500	500	500	500
Erie.....	400	400	300	400	450	500	500	500	500
Wabash.....	350	350	300	420	400	400	400	400	400
Penna.....	300	350	400	550	300	300	300	400	550
P. C. C. & St. L...	200	200	.....	.....	300	300	300	400	400
Monon.....	150	150	200	200	250	300	300	400	400
C. & E. I.....	200	200	200	250	300	300	300	350	400
B. & O.....	250	250	200	300	300	300	300	300	300
C. & A.....	100	100	200	250	300	300	200	300	300
A. E. & C. Electric.	.....	.....	.....	.....	.....	.....	200	350	400
Bottled Milk.....	.....	1 300	3 325	4 130	.....	.....	.....	.....	.....
Totals.....	16 100	17 560	20 125	24 150	24 300	24 800	27 200	28 650	29 850

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HEHNER'S TEST FOR FORMALDEHYD.

By M. L. Holm, Ph.G., Ph.C.

The most delicate and reliable test for formaldehyd in milk is undoubtedly that by means of sulphuric acid, first described by O. Hehner, although many details of application and modifications have been proposed. Nevertheless, we often hear of parties who either fail to obtain the reaction altogether or find the color so masked by charring that its delicacy is materially impaired.

When applying this test for formalin several factors are to be considered. First, the solution must not be too strong. It is particularly important for experimenters to remember that milk containing formaldehyd above 1-1000 does not show the characteristie purple, and only in dilutions of above 1-2000 will this color be distinct to ordinary acid. Second, the presence of some protein is essential to the reaction. In applying the test to substances other than milk it is well to add a small quantity. Other proteins, however, if milk is not at hand, will answer the purpose, viz.: Egg alb., gluten, peptone, etc. The color is not produced with gelatin. Third, the acid should contain a trace of iron. For this reason, commercial sulphuric acid has often been recommended, but it must not be forgotten that this product occasionally contains traces of formaldehyd, and should never be relied upon without carefully excluding same by control tests upon milk of known purity.

To avoid the charring, due to the action of the acid upon the milk solids, dilution of the milk with an equal volume of water has been recommended. The value of this

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procedure is chiefly in that the dilution allows the curd to rise higher above the zone of contact, giving the observer a better view. The charring is only done away with to a limited extent, because the heat generated by contact of the two liquids is about the same as previous to dilution. To lower the contact temperature it is necessary to dilute the acid. Heat, however, is essential to the reaction, and if not sufficiently generated by contact of the liquids, it must be artificially applied exactly as when the hydrochloric acid test is used. It is, however, not necessary to have a temperature sufficient to char the milk solids in order to bring out the maximum color.

Richmond and Boseley have shown that the delicacy of Hehner's test is increased by using a 90 to 94 per cent acid. I have found it advantageous to work with acid even weaker. A formula which I have found very satisfactory is as follows:

	cc.
Aqua dist	100.0
Acid sulph. C. P., sp. gr. 1.84	500.0
Liquor-ferri sulph	0.3

Mix in the order named, and cool.

This mixture will have a sp. gr. of about 1.80 at 25 C. and contain nearly 88 per cent absolute H_2SO_4. To apply the test place about 5 cc. of milk in a test tube and pour an equal volume of the reagent carefully down the side of the tube, so that it will flow under the milk; rotate gently to loosen the caseine from sides of the tube, thus allowing it to rise well above the contact zone, and observe a greenish yellow at the junction of the milk and acid if normal, whereas if formalin be present in any of the proportions commonly added for the purpose of preservation, a deep purple will be plainly seen and is characteristic.

Numerous experiments have been made to determine the delicacy of this reagent, and it was found to show the

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characteristic purple in milk containing formaldehyde in proportions between 1-1000 and 1-250 000. If stronger than 1-1000, a brownish-red is obtained with little or no shade of blue. In solutions weaker than 1-250 000 the blue shade also becomes faint, showing marked predominance of the red. As compared with normal milk, however, with good light it is possible to detect color change in dilutions as weak as 1-4 000 000 or even higher.

Concerning the value of this reagent for quantitative determinations, I believe it to be considerable in the hands of experienced observers. In quantities between 1-5000 and 1-40 000 there is no very marked difference. The most favorable dilution for the reaction is probably about 1-20 000. If the milk be weaker in formaldehyd, the lower portion of the color zone gradually becomes less purple, showing more pink. This area widens up to about 1-250 000, when only a very faint purple is observed at the top, the remainder showing only the red shade. If more than 1-20 000 of formaldehyd be present, the blue gradually disappears from the top of the zone up to 1-1000, beyond which a faint purple, at the lower portion, with increasing quantities, entirely fails to appear, leaving the whole zone a mahogany red, which in turn becomes weaker as strength is increased. In addition the color is developed more rapidly in low dilutions than in high.

With this reagent, I have not been able to notice any increased delicacy resulting from dilution of the milk, with water, except where the quantity of formalin was high.

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DETECTION OF BORIC ACID IN MILK.

FRANCIS J. SEITER, SC. B., ASSISTANT CHEMIST.

DURING the greater part of the past year the Laboratory has used with great success the excellent method of A. Goske (Zeitschr. f. Unters. d. Nahrungs u. Genussmittel, August, 1905), for the detection of boric acid in milk and other food stuffs. The advantages of the method are simplicity, great delicacy of reaction and economy of time and labor.

The method, as used by us, is as follows: 20 cc. of milk are placed in a 50 cc. beaker and 2 cc. concentrated hydrochloric acid are added. A strip of turmeric paper, 20 cm. by 2 cm. is suspended so that it dips below the surface of the milk and touches the bottom of the beaker. After twenty or thirty minutes, the liquid has arisen by capillary action and the familiar red-brown color appears as a zone between the wet and dry portions of the strip, if boric acid is present. On touching this colored zone with ammonia or soda solution, the slaty bluish-green color appears. This is additional proof.

A rough approximation to the amount of boric acid present may be made by comparing the colored zone thus obtained with the zones furnished by standard boric acid solutions treated in the identical manner as the milk. Solutions of boric acid are prepared of the following strengths: .01, .001, .0001 per cent; and 20 cc. portions of these solutions are treated exactly as above directed. After an hour or two, the colors will be sufficiently developed to allow a comparison to be made.

In examining food stuffs, 20 grams of the finely chopped material are moistened with 5 per cent sodium carbonate

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solution and heated at low heat until charred thoroughly —ignition to a white ash is neither necessary nor advisable. The charred mass is pulverized, stirred in a 50 cc. beaker with 20 cc. water and 2 cc. concentrated hydrochloric acid and a strip of test paper immersed as usual.

We have found the turmeric paper as supplied by the manufacturing chemists to be less satisfactory than the paper prepared by ourselves. The powdered turmeric root is digested with six volumes of 95 per cent alcohol for 24 hours at room temperature. The tincture is filtered and used as a stock solution, which is diluted to 20 volumes when required for use. Strips or sheets of filter paper are dipped into this diluted solution and dried in a dark place. The paper should be preserved in amber-colored bottles or opaque containers.

The test as above applied will show with certainty the presence of .0001 per cent boric acid, as was stated by Goske and as our experience has also shown.

We have found boric acid or borax only once in several thousand samples of milk examined in this Laboratory. However, a number of samples of butter, cheese, liquid eggs, sausage and potted or canned meats and other canned foods have been found to be preserved with boric acid during the past year.

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IDENTIFICATION OF COCAIN AND SOME COCAIN SUBSTITUTES.

By Francis J. Seiter, Sc. B., and Frederic Fenger, Ph. D.

During the year 1906 a large number of samples, alleged to be cocain, were submitted to the Chicago Health Department Laboratories for analysis, by the Police Department and by the Legal Aid Society of Chicago. In every instance the analyses were used as evidence in the courts in prosecuting the druggists or peddlers alleged to have sold the drugs to persons without a physician's prescription, in violation of the city ordinance.

Ordinarily, the identification of a drug as cocain presents no difficulty to the chemist, but in these cases there were three important considerations which rendered the problem less easy than at first imagined.

1. The samples submitted were very small, varying from one to three decigrams. They were contained in small red-brown pill boxes in which they had been sold, and generally represented about one-half the original contents.

2. The samples were generally heavily adulterated with acetanilid, the amounts varying from 20 to 80 per cent. In fact, one sample consisted wholly of acetanilid. This addition of acetanilid may have been practiced in order to prevent, or complicate the detection of cocain, or, more probably, because the drug was sold to those who snuffed or ate it, as the adulteration would not easily be discovered when used in that fashion. The insolubility of acetanilid would reveal the adulteration to one who used the drug in a hypodermic syringe.

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3. A sworn statement was made by the defense in one case—in which the writers, however, were not witnesses—that the drug which they had sold was not cocain, but a mixture of acetanilid, alpha-eucain, beta-eucain and spartein. This mixture was supposed to be used as a substitute for cocain, and did not constitute a violation of the ordinance.

These considerations, as above named, necessitated the adoption of a scheme of analysis in which the material might be economized without sacrificing accuracy. It was also necessary to study the reactions of the above mentioned drugs in order to be certain that the detection of cocain would not be interfered with.

The drugs studied were beta-eucain, cocain, acoin, holocain and euphthalmin.

The reactions and tests—which in our hands proved most satisfactory—are given in tabular form, and are sufficient to enable the chemist to identify the drugs if the conditions which we here lay down are carefully observed:

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Reagent.	Cocain.	Beta-eucain.	Acoin.	Holocain.	Euphthalmin.
$KMnO_4$	Violet-red rectangular crystals.	No crystals.	Immediate reduction.	Immediate reduction.	Slow reduction.
$PtCl_4$	Light yellow feather-shaped crystals, insoluble in alcohol.	Deep yellow leaves, rosettes and cubes, after 30 minutes.	Light yellow amorphous precipitate, soluble in alcohol.	White starry crystals, insoluble in alcohol.	No precipitate, even with excess of reagent.
$AuCl_3$	Yellow comb-shaped crystals.	Yellow amorphous finely divided precipitate.	Orange-yellow amorphous precipitate.	Orange-yellow amorphous precipitate.	No precipitate, save with excess of reagent. Yellow plates, leaves and rosettes.
H_2CrO_4	Yellow precipitate, soluble in HCl. Yellow needles separate out on standing.	Yellow precipitate, soluble in HCl. No crystals appear. Solution turns green.	Resinous yellow precipitate, partly soluble in HCl. Red-brown precipitate and brown solution.	Resinous yellow precipitate, soluble in HCl. Solution turns green. No crystals form.	No precipitate.
Cl-water	No precipitate.	Milky turbidity.	Claret solution and maroon precipitate.	Light yellow turbidity.	No precipitate.
Fuming HNO_3	Yellow.	No color.	Deep red to brown.	Blood orange.	Yellow.
Froehde's Reagent	Pink.	No color.	Bluish-green.	Bluish-green.	Pink.
PbO_2 and Acetic acid	No color.	No color.	Deep purple.	Salmon-pink.	No color.
H_2SO_4 and KNO_3	Pink.	Yellow.	Olive to deep green with trace of KNO_3. Red to brown with large crystal of KNO_3.	Yellow.	No color.
H_2SO_4 and TiO_2	No color.	No color.	Pink; on heating, red.	Orange to brown.	Faint violet.

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A preliminary examination of the sample is made to determine whether acetanilid, caffein, antipyrin, phenacetin, or other adulterations are present. If such are present, they should be removed by extraction with some immiscible solvent, as directed in the Star-Otto or Dragendorff schemes.

The alkaloids, freed from the above adulterants, are made up with water to a 2 per cent solution. A portion of this 2 per cent solution is further diluted to obtain a 1 per cent solution.

Potassium Permanganate Test.

To 1 cc. of a 2 per cent solution of the alkaloids are added ten drops of potassium permanganate solution (1-100) and reaction noted.

Cocain—A precipitate of cocain permanganate which, under the microscope, is found to consist of violet-red rectangular plates. This test gives better results in more concentrated solutions, but there is no difficulty in obtaining the crystals in a 2 per cent solution.

Beta-eucain—No precipitate in a 2 per cent solution.

Holocain and Acoin—The permanganate solution is reduced instantly.

Euphthalmin—The permanganate solution is slowly reduced.

Platinum Chlorid Test.

To 1 cc. of a 1 per cent solution of the alkaloids are added five drops of platinum chlorid solution (1-100). The test tube should not be shaken, as the crystals will be larger and better formed when the solution is not disturbed.

Cocain—A light yellow precipitate which, under the microscope, is found to consist of feather-shaped crystals. The crystals are insoluble in alcohol.

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Beta-eucain—After 15 to 30 minutes, a few deep yellow crystals. Under the microscope these are found to consist of broad leaf-shaped crystals, rosettes and cubes.

Acoin—A light yellow amorphous precipitate, soluble in alcohol.

Holocain—A white precipitate, which consists of small starry crystals, insoluble in alcohol.

Euphthalmin—No precipitate, even with excess of platinum chlorid solution.

Gold Chlorid Test.

To 1 cc. of a 1 per cent solution of the alkaloids are added 2 ccs. of water, and then 5 drops of gold chlorid solution (1-100), avoiding shaking as before.

Cocain—A yellow precipitate which consists of comb-shaped crystals.

Beta-eucain—A yellow precipitate very finely divided and amorphous.

Acoin and Holocain—Orange-yellow amorphous precipitates.

Euphthalmin—No precipitate with 5 drops of gold chlorid solution; with 2 or 3 ccs. of the reagent, large yellow plates, leaves and rosettes form after some time.

Chromic Acid Test.

To 1 cc. of a 1 per cent solution of the alkaloids are added 5 drops of chromic acid solution (1-20), and reaction noted. Then concentrated hydrochloric acid is added, drop by drop, shaking well, until the precipitate just dissolves. The tube is then placed aside for a few minutes.

Cocain—A yellow chromate which dissolves in the strong hydrochloric acid. After standing some time, clusters of fine needles appear and the solution remains yellow for 24 hours.

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Beta-eucain—A yellow precipitate which dissolves in strong hydrochloric acid. On standing 24 hours, no crystals appear and the solution turns green.

Acoin—A resinous yellow precipitate, soluble in hydrochloric acid. A reddish-brown powder is precipitated and the solution is colored brown, which finally becomes green.

Holocain—A resinous yellow precipitate, soluble in hydrochloric acid. The solution turns green on standing.

Chlorin Water Test.

To 1 cc. of a 1 per cent solution of the alkaloids are added 2 ccs. of saturated chlorin water.

Cocain—No precipitate.

Beta-eucain—A dense white turbidity.

Acoin—A claret-colored solution from which a maroon precipitate forms on standing.

Holocain—A light yellow turbidity.

Euphthalmin—No precipitate.

The reactions, as given above, are sufficient to establish the identity of the alkaloids named, and thus disprove the assertion that it is impossible to differentiate between cocain and beta-eucain.

The color reactions of cocain, beta-eucain and euphthalmin are not very striking, as may be seen by consulting the table here given. Acoin and holocain, however, furnish very delicate color reactions. These reactions were made in the usual manner. A few milligrams of the alkaloid were treated with a corresponding amount of the dry reagent, or a few drops of the acid, in a small porcelain dish, heating on the water bath if necessary.

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SANITARY WATER ANALYSIS.

By Frederick O. Tonney, A. B., First Assistant Chemist.

It is the purpose of this article to offer a few practical suggestions, based upon the experience of the writer, with regard to the methods of sanitary water analysis and laboratory facilities, best suited to needs of the municipal chemist, and also to present and discuss a few of the problems which come up for consideration in connection with the water supply of a large municipality.

In the course of the last ten years almost every known test bearing on the potability of drinking water has been investigated and tried in the Health Department Laboratories, with the result that a few tests possessing undisputed value have been permanently adopted, while a larger number have been abandoned, either as furnishing little or no evidence of contamination or as involving too much time for practicability, or as unsuited to the local characteristics of Chicago waters.

Source of Water.

In passing upon the sanitary quality of drinking water, considerably more attention is now paid than formerly to evidences of contamination, aside from chemical and bacteriologic data. In other words, it is beginning to be recognized that it is impossible intelligently to pass upon the safety of a water whose history and source is entirely unknown to the analyst. This is true for the simple reason that even the best tests known to science are comparative in principle and must refer back to analyses of waters from the same source which are known or believed to be free from

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sewage contamination. Since pure waters vary considerably in chemical composition, it is quite possible that a given chemical result in one case would mean nothing, while in another this figure would be certain proof of contamination. For example, the normal ammonia content of undefiled lake water is .001 parts free and .007 parts albuminoid, per 100 000. Normal surface well waters average about .003 free and .012 albuminoid, while waters from the deeper strata contain .010 to .050 parts each of free and albuminoid ammonia which have been absorbed from organic deposits in the subsoil. It is quite evident, therefore, that a result of .005 free and .020 albuminoid would not condemn a deep well water, while such an analysis of Lake Michigan water would be unmistakable evidence of contamination.

Furthermore, it often happens that chemical and bacteriologic analyses are difficult of interpretation, and in such cases it is imperative that one consider such data as proximity of outhouses, stables, slope of land, depth of well, etc. The writer, therefore, has had the following blank form printed for obtaining such information at the time of collection:

DATA TO BE OBTAINED ON RECEIVING WATER SAMPLE FOR ANALYSIS.

Is the sample well water or Lake Michigan water ?.....

If well water—

Depth of well ?.....

Kind of well ? (drilled or excavated) .....

Cased ?.....

Cement lined ?.....

Brick lined ?.....

Rock lined ?..... .....

Open at bottom ?.....

Are there outhouses or stables near ? .....

At what distance ?.....

Are there other possible sources of contamination ?.....

....

What is the occasion for the analysis ? .....

....

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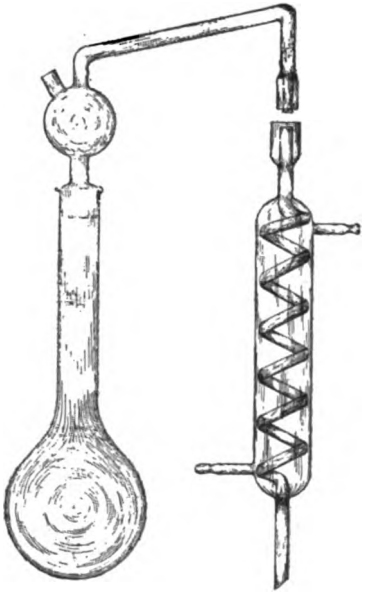
If lake water—
From hydrant?.....
From lake?.....
Distance from shore?.....
Proximity of sewers?.....
What is the occasion for the analysis?.....

Determination of Ammonia.

For the ammonia determination the specially designed apparatus shown in the accompanying cut has been found to be excellent. Its salient points are absence of rubber or



cork connections, compactness and convenience. The connection between the conveyor and the flask is of ground glass, while in that between the conveyor and the condenser the delivery tube dips beneath a moat of mercury, forming an easily removable air-tight joint.

For greater accuracy in the Nessler readings, it has been found advisable to use a nesslerizing stand whose floor

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is a mirror, a device which by doubling the length of the column to be read aids materially in obtaining sharp readings.

As a substitute for the Nessler standards, commonly made up from known amounts of ammonium chlorid and Nessler's solution, the writer has instituted the use of permanent standards of platinum-cobalt chlorid.*

The old method of standardization is open to objection on several grounds, *i.e.*, since the color deepens perceptibly for 5 to 10 hours after adding the Nessler solution, fresh standards must be made for each analysis if strictly comparable results are desired, and such results are particularly important to the water analyst. Again, the expenditure of considerable time and care is necessary in keeping on hand a supply of ammonia free water, an accessory which is almost entirely dispensed with when permanent standards are used. Ordinary distilled water can be used for all reagents except Nessler's solution. A more important objection, however, lies in the fact that the standards are apt to become more or less cloudy on standing, sometimes to such an extent as to render impossible the accurate estimation of results. This difficulty may owe its explanation to one of a number of causes, chief among which appears to be the presence of impurities in the ammonium chlorid purchased upon the American market. Its occurrence, however, occasions considerable inconvenience and it is often very difficult to obviate.

The permanent standards are made up from solutions of about 10 per cent platinum chlorid and 10 per cent cobaltous chlorid in 50 to 60 per cent hydrochloric acid. By mixing the greenish yellow platinum solution with the pink cobalt solution, an amber color is produced, which, by using varying portions of the ingredients and diluting with distilled

* First suggested by Hazen.

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water, may be made to match exactly the original standards. The color has been found to be permanent. The same standards have been in use in the Laboratory for a period of about five months, and repeated checking of the tints with ammonium chlorid and Nessler's solution has failed to disclose any perceptible loss of color.

The oxygen consumed as determined in the Laboratory offers no special points of interest. It is conducted in the old, well-tried, orthodox fashion, without any important modifications of method. The sample is heated for twenty minutes at 100° C. with acid permanganate of potash, and the loss of oxygen determined by titration with ferrous ammonium sulphate. For chlorids, both the Vollard and the potassium chromate methods are utilized, solutions being so made up as to read directly in parts per 100 000 upon the final titration.

Determination of Nitrates.

For determination of nitrates a special method has been developed, involving none of the inconveniences and multiple calculations of the ammonium picrate method commonly in use. It is based upon the reduction of nitrates and nitrites to ammonia by metallic aluminum in alkaline solution. To a definite volume of the sample is added 5 cc. of a 10 per cent solution of potassium hydrate containing 5 per cent of potassium carbonate. The liquid is evaporated to two-thirds its volume to insure absence of ammonia, and is then diluted with ammonia free water back to the original volume. A coil of aluminum wire is now introduced and allowed to remain over night. At the end of this time 100 cc. of the solution are decanted from the precipitated carbonates and tested directly with Nessler's solution. The amount of ammonia present, multiplied by three, represents nitrogen as N_2O_5, and from these figures parts per 100 000

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may be readily calculated. Nitrites, if present, should be determined by the Griess method and a corresponding correction made.

Other details, the importance of which is not commonly appreciated, should be given attention, such as facilities for cleanliness, the conducting of the water analysis in a room entirely separate from the general chemical laboratory, and using ammonia flasks and apparatus for no other purpose than water analysis. Such details as the use of tile-covered tables, which are easily cleansed, and keeping the floors well oiled to lay the dust of sweeping, will be found valuable adjuncts to the water analysis equipment. In experiments in which a small amount of dust taken from the window sills and shelves was introduced into the flasks, I have found that the albuminoid ammonia results were increased from .007 to .015 and .020 parts per 100 000—a fact which amply emphasizes the importance of cleanliness—while as regards separate quarters, it is well known that fumes from a general laboratory render water analysis results absolutely valueless.

Bacteriologic Examination.

In addition to the chemical analysis, bacteriologic examination of drinking water is carried out in the Laboratory, in all cases. A small sterilized bottle is for this purpose included in each outfit given out for the collection of samples. Although the old idea of testing for specific disease-bearing organisms has been shown by experience to be impractical, nevertheless considerable valuable information may be deduced bacteriologically bearing upon the likelihood of sewage contamination. A bacterial count is to be recommended, and particularly, the detection of bacillus coli communis, a normal resident of the human intestine, is important, although it cannot, according to our latest information, be considered positive proof of contamination.

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Aside from these two tests, the bacteriologic methods thus far developed are too cumbersome, or involve too much time for practical value.

Significance of Results.

As regards the interpretation of results it may as well be stated at the outset that the intelligent performance of this office requires something more than mere tabulation of analytic data. It is impossible to conduct water analysis upon the same exact chemical basis that characterizes the analysis of an ore or a food stuff. There is constant need for the use of careful judgment on the part of the analyst. He must consider not only chemical and bacteriologic findings, but the various physical possibilities of contamination. He must note sources, history, proximity of stables, sewers, the slope of land, etc. He must distinguish between surface waters and waters of deep origin, and to this end should realize the geological significance of calcium, iron or sulphid contents. It is advisable to have at hand a map of the locality, for collecting various information regarding position of streams, relation of sources to sewer outlets, conditions of drainage, etc. Weather conditions should be noted at the time of analysis, and above all the analyst should be thoroughly familiar with the local characteristics of the waters to be analyzed.

In a general way it may be stated that free ammonia represents decomposed or decomposing animal matter; albuminoid ammonia represents undecomposed animal or albuminous matter. The amount of oxygen consumed reveals the total organic content, both of vegetable and animal origin. Chlorin may indicate animal excretions or may be accounted for by deposits of chlorids in the soil. Nitrites indicate a later stage of proteid decomposition than that indicated by the ammonias—*i. e.*, a safer stage if such

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proteid matter is due to sewage. Nitrates may indicate a still later stage, or again may be accounted for by deposits of metallic nitrates through which the water has percolated. A negative test for colon bacillus is satisfactory proof of the absence of sewage and on the other hand a positive test is strong indication of the presence of animal excrement, but here again we are confronted with the fact that this organism is sometimes to be found in ordinary soil.

By far the most valuable of the above mentioned sources of information is, in the experience of the Laboratory, that furnished by the free and albuminoid ammonias, excepting, of course, in the case of deep well waters. This test is particularly well adapted to the daily analysis of samples of Chicago water pumping stations because of its extreme delicacy, and because, by affording immediate results, it renders sanitary designation possible before the water reaches the consumer. Through the ammonias we are able to test directly for a constituent, which must always be present in fresh sewage, *i. e.*, dead animal matter or excrement. A variation of .001 part per 100 000 from the normal albuminous content of Lake Michigan water may readily be detected by this method. The ammonia content of the undefiled midlake water remains constant at .001 free and .007 albuminoid per 100 000, with slight variations according to the season of the year. A result of .001 to .002 free and .012 albuminoid must be considered suspicious, provided that such data as the weather conditions, direction of the wind, proximity of the few remaining sewers, etc., favor the possibility of contamination. Otherwise such a result may be and often is due to local increase in the organic life of the water near the crib, or to the stirring up of organic sediment from the lake bottom. Results higher than those just mentioned are never allowed to pass as safe, although, in the opinion of the writer, it is probably impossible for the small amount of

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shore sewage still unintercepted to be carried out as far as the cribs against the current created by the Drainage Channel.

Total organic content, which is ascertained by determination of the oxygen consumed, is found to be valuable as an accessory test in conjunction with the ammonias. In the case of high ammonia results an increase is also to be expected in the oxygen consumed. The combination of high oxygen consumed with a normal ammonia content may explain away a suspicious looking sediment by characterizing it as vegetable and not animal in origin.

Bacteriologic examinations of daily samples are useful only as check tests, since they require from 24 to 48 hours time for completion, and hence are not available for early sanitary designation.

Nitrites are seldom found in excess of the normal midlake content, and nitrates so rarely and in such minute quantities as to be valueless as a factor in the determination of sanitary quality.

Chlorin Unimportant.

The detection of chlorin in the daily samples has also been discontinued as giving little or no evidence of recent contamination in the case of this particular source of supply. Sodium chlorid, which is a chemically stable, non-volatile substance, will, of course, remain dissolved long after all the organic constituents of sewage, including pathologic bacteria, have disappeared. It is, therefore, valuable only when considered in connection with data bearing upon the recency of contamination. Furthermore, it was found impossible, in the case of Lake Michigan water, to set any definite standards for the comparison of chlorin results. Midlake water, in which, of course, all possibility of contamination is eliminated, has been found to contain from .100 to .900 parts per 100 000, all possible variations between these

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figures being obtained in the course of a few successive days. Analyses of samples from the cribs show similar erratic results, which are found to be entirely independent of the bacteriologic findings or the presence of organic matter.

Microscopic Examination.

Microscopic examination has also been resorted to in cases of doubtful analytical data, in the effort to differentiate between the organic sediments commonly found in lake water, chiefly of vegetable origin, and the inert solid matter characteristic of fresh sewage. Samples of sediment collected during the summer from the Laboratory tap at the City Hall failed to show any solid particles of sewage under the microscope, but revealed large numbers of animal and vegetable organisms, among which were the following: Cyclops, quadricornis, bosmina, longirostris, amoeba, diatoms, hydrodictyon and spirogyra, the first three of which showed lively movements. Of the vegetable forms, by far the most numerous were diatoms, of which the following species were recognized: Diatoma vulgare, diatoma tenue, tabellaria flocculosa, navicula gracilis and asterionella. All of these organisms are harmless residents of natural waters, and their presence during the spring and summer months accounts for the high albuminoid ammonia results occasionally noticed in samples containing sediment. Analysis of the dried sediment collected from the Laboratory tap showed .500 part per 100 000 of albuminoid ammonia.

With a view to determine more definitely the relation of the sediment to albuminoid ammonia and oxygen consumed, two daily analyses of samples from the pumping stations have been made during the past year, one upon the filtered and the other upon the unfiltered water. It has been found that in the case of Lake Michigan water, the appearance of any considerable amount of solid matter increases the

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figures of both these tests in approximate proportion to the amount of sediment present, and that in most cases of high results the increase above normal is entirely due to the sediment. An exception was noted in the case of the Rogers Park samples, before the city water was turned into the mains of this suburb. Although the high results were partly due to the large amount of sediment present, nevertheless the filtered samples also showed results considerably above normal, a fact which, indicating as it does the presence of soluble and hence more or less broken-down albuminous matter, must be looked upon as much stronger evidence of sewage contamination than high ammonias depending on sediment alone, since the sediment may and often does owe its presence to living organisms of harmless character.

Turbidity Harmless.

The organic sediment above mentioned, which occurs only rarely even in the summer months, should not be confused with the milky turbidity of the lake water, which invariably appears after wind storms of any consequence, and which can readily be distinguished from organic sediment by its whitish or milky appearance. Complaints on this score are not infrequent. The presence of this sediment, however, is found to have no effect on the oxygen consumed and albuminoid ammonia results, analyses being in every case identical in both filtered and unfiltered samples, a fact which excludes all possibility of the presence of animal matter in the sediment. The turbidity is due to a suspension of finely divided particles of alumina and silica, which have been carried up from the clay deposits of the lake bottom by violent or long continued agitation of the water. It is, of course, absolutely harmless and does not affect potability.

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It may also be well to add a few words of explanation regarding the sediment which collects in the hot-water tanks of private consumers, concerning which numerous complaints have reached the DEPARTMENT. The sediment or rather precipitate which collects in these cases constitutes what is known to the chemist as the "temporary hardness" or the hardness which is destroyed by boiling, a characteristic which serves to distinguish it from "permanent hardness" which is not affected by boiling. The precipitate consists of lime salts which are present in the natural water as soluble bicarbonates, and which are converted by heat into insoluble normal carbonates. These substances gradually collect, together with small particles of miscellaneous matter, as a dirty white layer upon the tank bottom, and when for any reason the water becomes agitated, the settlings are transferred through the pipes to wash basins and bath tubs supplied by the tank. This condition is unavoidable, and it is, of course, absolutely unimportant from a sanitary standpoint. It may be remedied by occasional flushing of the tanks.

MINERAL ANALYSIS OF LAKE MICHIGAN WATER.

	Per cent.	Parts per 100 000.
Silica	.0021	2.100
Calcium Carbonate	.0008	.800
Magnesium Carbonate	.00318	3.180
Calcium Sulphate	.00657	6.570
Sodium Chlorid	.00049	.490
Sodium and Potassium Carbonates	.00784	7.840
Iron and Alumina	trace.	trace.

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FOOD INSPECTION.

By P. J. Murray, Chief Food Inspector.

The Food Inspection Bureau of the Laboratories has accomplished more during 1906 than during any other three years of its existence. The amount of unwholesome foodstuffs condemned and destroyed is 10 940 660 pounds. This is an increase of more than 250 per cent as compared with 1905. Of this amount, 7 332 969 pounds were condemned and destroyed at the Union stockyards and 3 607 691 pounds in the loop district. This, however, is only a small part of the work accomplished. Many more millions of pounds have been kept off the markets or sent to other places rather than submit to inspection. The increase of the inspection forces of nearly 100 per cent has enabled the extension of the inspection to many varieties of foodstuffs and retail markets hitherto uncontrolled or only in an imperfect manner.

Approximately 17 000 000 food animals have been slaughtered in twenty-seven slaughtering houses located in the slaughtering and rendering districts of the Union stockyards of Chicago during 1906. Of these the city meat inspectors condemned and destroyed on post mortem examination 26 096. This is an average of twenty-one in every 10 000 animals slaughtered. Besides these that were condemned, approximately 16 000 animals died en route or in the yards, and were rendered into fertilizer and by-products at Globe, Indiana, by the Union Rendering Co. The average condemnations of food animals in 157 abattoirs under Federal inspection during the year is sixteen in every 10 000 killed.

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The principal causes for condemnations were as follows:

CATTLE.

Tuberculosis, 82 per cent.
Actinomycosis, 14 per cent.
Aenemia, septicemia, emaciation, etc., 4 per cent.

HOGS.

Tuberculosis, 65 per cent.
Cholera and swine plague, 20 per cent.
Jaundice, uremia, peritonitis, 5 per eent.

CALVES.

"Slunks," 98 per cent.
Pleuritis, peritonitis, etc., 2 per cent.

The number of carcasses of food animals killed by dairymen and shipped into Chicago via the various railroads, freight, express and steamboat lines to South Water, Fulton and Haymarkets, are as follows:

Cattle, 12 500, of which 108 were condemned.
Hogs. 2600, of which 305 were condemned.
Sheep and lambs, 30 000, of which 121 were condemned.
Calves, 610 000, of which 2405 were condemned.
Total. 678 500, of which 3240 were condemned—an average of fifty animals condemned in every 10 000 examined.

The large ratio of condemnations in the "loop district" is due to improper slaughtering and cooling, damage in transit or in cold storage or by improper care on arrival, weather conditions, train wrecks, etc.

The co-operation of the meat, milk and dairy inspectors has resulted in the tracing of tubercular-infected cows in a number of herds supplying milk to Chicago.

Canned Goods.

For the first time in the history of the DEPARTMENT particular attention was given to canned goods, 686 872 pounds of which were condemned and destroyed—36.226 pounds at the Stockyards and 650 646 pounds in the "loop

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district." Through the efforts of the Chief Food Inspector, several factories where spoiled canned goods were reprocessed and relabeled, were closed and the owners subjected to heavy fines. This was a direct result of a case of sickness caused by eating reprocessed salmon. The investigation of this case led to the discovery and closing of the largest reprocessing concern in the city. Through the owners of this concern the location of several others was made known.

These concerns regularly bid for and purchased all the spoiled canned goods in the possession of the various wholesale grocery houses. To prevent any further traffic in these death-dealing foodstuffs, the proprietors of all the wholesale grocery houses were notified that, hereafter, notice must be given to the DEPARTMENT OF HEALTH whenever any of these goods came into their possession; otherwise they would be prosecuted under Section 1162 of the Health Ordinances of the City of Chicago, which is as follows:

> 1162. UNWHOLESOME FOOD—DUTY OF INDIVIDUALS.] It shall be the duty of every person knowing of any fish, meat, fowls, birds or vegetables being bought, sold or offered or held for sale as human food in the city, which is not sound, healthy, or wholesome for such food, to forthwith report such facts and the particulars relating thereto, to the Department of Health, or to one of its officers or inspectors

This put a stop to this nefarious practice immediately. The DEPARTMENT is now notified by the wholesale dealers whenever they receive any spoiled canned goods, and an inspector promptly condemns and destroys them.

Desiccated Eggs.

Several tons of desiccated eggs were condemned and destroyed, and three concerns that manufactured this product were closed and two others compelled to improve their product.

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The three concerns closed were found, upon investigation, to be using rotten eggs, technically known as "spots and rots." These were dumped into a large cylinder, shells, dirt and all, then strained to remove the shells, and dried upon metal cylinders. This dried product was then powdered and retailed at 80 cents a pound to large bakeries.

This product, upon analysis, was found to contain 20 to 25 per cent moisture and an enormous number of putrefactive and many pathogenic bacteria. It also possessed a very penetrating, disagreeable, putrefactive odor.

Several hundred pounds of liquid decayed eggs, in cans, were condemned and destroyed in one of the large cold-storage houses. These eggs contained a large percentage of borax to prevent further decomposition. These eggs are prepared by a firm in St. Louis and sold principally to the large pie bakeries in Chicago.

Cold Storage.

A great deal of attention has been paid to the various cold-storage houses. The agitation that has been going on for years has finally culminated in the drawing of a cold-storage ordinance. This, however, did not appear to meet the requirements, and was defeated; but the COMMISSIONER OF HEALTH is now preparing another cold-storage ordinance, as it has been conclusively proven that some method of inspection and regulation of this industry is necessary. The condemnation of poultry during the year was 45 288 pounds, more than 25 000 pounds of which were condemned in the various cold-storage houses, while a still larger quantity has been shipped out of the city rather than submit to inspection. Besides this, there are still in one of the large cold-storage houses, 3000 pounds of poultry that have been condemned by the DEPARTMENT, but have not been

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destroyed, owing to an injunction procured by the owner restraining the city from destroying the same. The case is now before the court, and no doubt a decision will be rendered in favor of the city, as it has been conclusively proven that this poultry was not first-class and not in a wholesome condition when placed in cold-storage, where it had been over seven months.

Hundreds of pounds of poultry have been condemned in the retail markets that showed evidences of having been reprocessed after removal from cold-storage.

The food inspectors have condemned over a million pounds of fruit and vegetables, principally in the wholesale markets. This includes several carloads of lemons, oranges and bananas from California, potatoes and peaches from Michigan and melons from Texas.

Peddlers.

The Greek fruit and vegetable peddlers have received considerable attention during the year. Over seventy-five of them have been arrested and fined $100.00 and costs for keeping their fruit and vegetables in the same room where they and also their horses slept. The unsanitary condition of many of these places was beyond description.

The owners of a number of fruit stands near the large railway depots have been arrested and fined for selling baskets of fruit containing decayed fruit in the bottom with a layer of sound fruit on top.

Nearly a thousand fruit and vegetable venders were found who had no license.

Meats.

Particular attention has been paid to the retail markets during the year, and in these 120 414 pounds of cut meats

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have been condemned and destroyed. In addition to this, the inspectors at the Union Stockyards have destroyed 637 378 pounds of cut meats. Most of this was returned from various branch houses or was confined in the sausage rooms of the large packing houses, where it was being made into sausage. The principal cause for condemnation was decomposition. Most of this meat is either sour and slimy or in some cases even putrid.

The city inspectors have condemned and destroyed in the Stockyards 7 332 969 pounds of meats. This is an enormous increase over the amounts condemned during previous years.

Stockyards Inspection.

Until about a year ago, the inspection of meats in the Union Stockyards of Chicago was entirely under the supervision of the Federal inspectors, and inspection was merely for the purpose of excluding diseased and unhealthy animals which were brought here to be prepared as food for the world's market. Unfortunately, the jurisdiction of the Government inspectors was confined to the condemnation of such animals. They had no power to destroy and were not empowered to reinspect or pass upon such meat as had been cut or manufactured into by-products. This condition, however, was soon recognized by the present COMMISSIONER OF HEALTH who re-established city inspection in the stockyards after a lapse of several years. It was intended that the city inspectors should co-operate with the Federal officials and should destroy all meat or meat products condemned by themselves or by the Federal inspectors. Thus it was hoped to establish with their aid a perfect inspection over this important, extensive and rapidly increasing industry.

The recent investigation of the Stockyards has led to the conferring by Congress of power on the Federal

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inspectors in order that they may now destroy all meats they have condemned, and their inspection now extends to all cut and otherwise prepared and manufactured meat products.

The sanitary condition at the Stockyards under the new law has improved about 200 per cent, and ante- and post-mortem examination of all food producing animals is now made and the meat food products are now under the supervision of the city and Government meat inspectors until they leave the city. However, the small number of city inspectors in the Stockyards is unable to efficiently cope with the situation. During the past year approximately 15 000 cattle, 25 000 hogs and 15 000 sheep were slaughtered daily the year round in the Stockyards. When it is considered that each one of these animals must be rigorously inspected one may realize what an enormous amount of work it means for this small force of seven men.

At present all animals are examined by the Government inspectors; then they are re-examined, especially all suspicious and rejected animals, by both Government and city experts, who render the final verdict,—*i. e.*, "Passed for Food" or "Condemned."

The present inspection, while it is of untold value, is not as yet ideal and no doubt a number of loopholes exist whereby animals showing very slight evidences of disease may be sold for food. But in general it may be stated that the present inspection at the Union Stockyards of Chicago, both Government and city, has vastly improved within the last year, and while it is true that Government inspection does not extend to all slaughter houses, the city inspectors exercise a rigid and efficient control over houses that are not under Government inspection. The result is that very

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little diseased meat of such a character as is likely to cause sickness or death among the consumers thereof ever reaches the markets in Chicago or elsewhere from the Union Stock-yards.

City Markets Inspection.

The inspection in the wholesale and retail markets of the city shows an increase of nearly 300 per cent in condemnations of food for 1906 over the previous year. As heretofore, the principal sources of supply have been rigorously and thoroughly examined, so that it is safe to say that very little food of an unwholesome nature escapes from the wholesale markets.

The retail markets have also received their due share of attention, and several hundred thousand pounds of unfit foodstuffs of various kinds have been condemned in the retail markets. Most of the condemnations in the retail markets were of foods that had deteriorated while in the possession of the retailer. It is, of course, impossible to carefully supervise this work, owing to the enormous number of retail markets in the city, but it is safe to say that little diseased meat reaches these markets, and usually the consumer is able to detect any decomposition that has occurred in these foodstuffs after they have been inspected in the wholesale market or slaughter house. This is especially borne out by the fact that nearly 2000 complaints have been investigated during the year by the inspectors—practically all of these complaints having come from the consumer—and an investigation of them shows that in less than 50 per cent of this number the complaint was justified. Many cases, however, were due to malice, and although this is a well recognized condition, as it cannot be told beforehand, every complaint is thoroughly investigated.

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The food products as purchased by the consumer, manufactured outside the city, will hereafter be subject to a rigid Federal inspection, and it devolves upon the city and the State to enforce the same rigid inspection upon such products as are manufactured within the city limits. This has reduced the work of the inspectors to a great extent, and it may be assumed that in the coming year practically little or no poisonous or deleterious food products will be found upon the city market.

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THE SANITARY CONDITION OF THE CITY WATER DURING THE YEAR 1906.

HUGO JONE, SC. B., CHIEF CHEMIST.

THE city water from the various pumping stations throughout the year 1906 was nearly always free from pollution such as may come from the shore. The only station which did not furnish permanently pure water throughout the year was the Rogers Park station. The water from this station was supplied until September 13, 1906, by the Rogers Park Water Company, which did not have the proper facilities for supplying pure water. After the city took charge of the system and supplied it with water from the Lake View pumping station, the Rogers Park water was permanently pure.

The satisfactory condition of the water from all the other pumping stations is demonstrated by the high percentages of those samples which the reports of the water analyst show to be "safe." These percentages are given in the following tables:

SAMPLES TAKEN DURING THE YEAR 1906.	Per cent of samples "safe."	Per cent of samples "unsafe."
Fourteenth Street station	99.6	0.4
Chicago Avenue station	99.3	0.7
Hyde Park station	98.7	1.3
Lake View station	100.0	0.0
Central Park Avenue station	99.6	0.4
Harrison Street station	99.6	0.4
Ashland Avenue station	99.3	0.7
Springfield Avenue station	100.0	0.0

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SAMPLES TAKEN JANUARY 1—JUNE 30, 1906.	Per cent of samples "safe."	Per cent of samples "unsafe."
Fourteenth Street station	100.0	0.0
Chicago Avenue station	100.0	0.0
Hyde Park station	99.4	0.6
Lake View station	100.0	0.0
Central Park Avenue station	100.0	0.0
Harrison Street station	100.0	0.0
Ashland Avenue station	100.0	0.0
Springfield Avenue station	100.0	0.0

SAMPLES TAKEN JULY 1—DECEMBER 31, 1906.	Per cent of samples "safe."	Per cent of samples "unsafe."
Fourteenth Street station	99.3	0.7
Chicago Avenue station	98.7	1.3
Hyde Park station	98.0	2.0
Lake View station	100.0	0.0
Central Park Avenue station	99.3	0.7
Harrison Street station	99.3	0.7
Ashland Avenue station	98.7	1.3
Springfield Avenue station	100.0	0.0

Just what is meant by "safe" and "unsafe" and by what method these characterizations are framed, is explained in detail in the Biennial Report of the DEPARTMENT for 1904-1905, on pages 119 to 121.

Deficient Rainfall Beneficial.

While a deficient rainfall during the year 1906, and more especially during the summer of that year, caused shallow wells and similar sources of water in some localities to be polluted in consequence of the low water level which undoubtedly, in some instances, allowed the contents of privy vaults, waste water, etc., to drain or percolate into such wells, the City of Chicago was fortunate in that the public water supply was not affected in this manner. A deficient rainfall has rather a beneficial effect upon the city water, as excessive flushing of sewers and pollution of the lake water by sewer contents or by rain water coming from

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the shore and carrying animal matter, is reduced. Thus the public water supply was safe, when water coming from other sources is known to have caused or suspected of having caused quite a number of typhoid-fever cases.

While the city water has been practically free from animal matter or other pollution from the shore, the sediment stirred up in the water by violent storms has sometimes given rise to fears that the water might not be safe for drinking purposes. These fears, however, are largely unfounded, as will become evident from the following statements which were published once or twice during the year, but which have not yet been disseminated as widely as seems necessary. These statements are not applicable to the Rogers Park water so long as it was drawn from a place less than three-fourths of a mile from shore.

Turbidity Harmless.

"The suspended or floating matter in Lake Michigan water consists, in mid-lake, largely of living organisms, there being little, if any, clay or similar material stirred up from the bottom at places where the depth exceeds 50 feet, except by violent storms. Near the shore, the suspended matter is a mixture of clay and lime from the bottom, animal and vegetable particles from the shore and also the living organisms which are found in mid-lake. While the suspended matter near the shore, being polluted by animal matter, is more or less liable to carry disease germs, the suspended matter in mid-lake and at the intakes is of an entirely different nature. It consists chiefly of diatoms, which are plants of microscopic smallness, and, as a rule, just as harmless as celery or lettuce.

"The solid particles of decaying animal matter or of sewage near the shore have never been found in the suspended matter of the city water taken in at the cribs. Only

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the dissolved portion of the shore pollution is occasionally found in the city water. Furthermore, microscopic and other examination of the suspended matter in the city water have failed to show any other solid particles of a harmful nature. The conclusion, therefore, is that the suspended matter in the city water is generally, if not always, of the harmless kind.

"It is certainly true that, besides the diatoms and similar organisms, small particles of clay or lime are occasionally stirred up from the bottom of the lake by storms, and that they get into and discolor the city water. But these substances are incapable of producing disease. While it is not pleasant to drink water which is turbid from suspended matter nobody can contract typhoid-fever from that kind of suspended matter.

"The idea that turbid water must necessarily be harmful is widespread, but nevertheless erroneous. Whenever pollution reaches the cribs it is, as a rule, in the dissolved condition—not in the form of solid particles. In other words: pollution is invisible in the case of city water

"Another popular error which needs correction is the idea that organisms, especially the diatoms, which can be seen with the naked eye or a low magnifying power, are of a harmful nature. It needs be borne in mind that the really harmful organisms, such as the typhoid germ and the germ of dysentery, are much too small to be seen by the naked eye. The visible organisms are harmless as a rule, and the disease germs are invisible. Hence we cannot judge the sanitary quality of the city water by simply looking at it and estimating the extent of the turbidity or the quantity of the suspended matter.

"The water may be quite turbid from diatoms, lime and clay and yet be entirely incapable of producing disease. Only when sewage or similar disease-breeding pollution gets into it, does it become dangerous to health."

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Purity of Supply.

After the fact has been established that the city water during the year 1906, with the exception of the Rogers Park water, was almost entirely free from shore pollution and that the suspended matter coming from the vicinity of the cribs is of the harmless kind, it is safe to conclude that during the year 1906 this water cannot have produced any typhoid-fever in the city, but that, on the contrary, it surpasses the water supplies of most other cities both in quality and quantity. Almost the only remaining possibility of infecting the city water is that by means of the filth which is dropped from excursion boats and other vessels.

Rogers Park Water.

As regards the Rogers Park water, I will first review the causes of the pollution and then substantiate my statement that the water was better after the city had supplanted the water of the Rogers Park Water Co. by the city water from the Lake View pumping station, by submitting the necessary facts and figures. The change was made by the city, as stated above, on Thursday, September 13, 1906, after an exhaustive investigation by the HEALTH DEPARTMENT had shown the water of the company to be polluted. A brief summary of the investigation and its results was given by the DEPARTMENT in the Weekly Bulletin of August 18, 1906. To avoid useless duplication of statements, I will here quote that section of the Bulletin which deals with the Rogers Park water.

Special Investigation.

Section of the Weekly Bulletin of August 18, 1906:

"Noting an increasing frequency of pollution of the Rogers Park water supply for some weeks previous, on July 24th, ult., a special investigation by the Director of the

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Laboratory and the Chief Chemist of the DEPARTMENT was ordered, with a view to determining the cause or causes and to seeking remedies therefor.

"During the previous seven weeks the supply had averaged nearly one-third of the time 'unsafe,' while the supplies from the eight city pumping stations were uniformly 'safe,' and had been so since the first of the year.

"Although there was a strong presumption that the filtering plant at this station was at fault—as had been determined on several previous occasions—it was deemed advisable to make a thorough investigation of all the physical conditions, since the extent and character of the pollution had never before been so marked.

"Following is a brief summary of the results of this investigation, which have already been submitted to His Honor, the Mayor:

"The Rogers Park water supply is drawn from near the bottom of the lake, at a distance of 3300 feet from the shore and in a depth of about 20 feet of water. The shallowness of the water and the proximity of the intake to the bottom are causes of the turbidity of the water and of the excess of sediment and organic matter so frequently shown by the chemical examinations. Winds of moderate velocity stir up the lake bottom at this depth, and the varying wind action, accounts largely for the great fluctuations in the determinations, ranging from a mere trace to .002 parts of free ammonia (evidence of old organic pollution), from .007 to .020 parts of albuminoid ammonia (evidence of recent organic pollution), and from .070 to .420 of oxygen consumed (indication of amount of organic matter present). The 'safe' proportions of these constituents are .001, .011 and .120, respectively, during the summer; somewhat less in the winter, when lacustrine organic life is less active.

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"These proportions are for 100 000 parts of the water each.

"On its way to the pumping engines the water passes through a settling basin, and, under ordinary circumstances, a considerable amount of sedimentation takes place in this basin before the water reaches the filters. From the settling basin the water is drawn through a tank, in which it is treated with a varying amount of alum as precipitant; thence it passes to and through the filters to a standpipe, whence it flows into the distributing mains.

"The settling basin is cleansed at irregular intervals, sometimes after using a number of weeks or months. The amount of alum used varies from one-sixth of a grain to two grains per gallon. Less than one grain is valueless as a precipitant in water so heavily charged with organic matter.

"The filters have a nominal maximum capacity of 500 000 gallons per day. The daily summer demand of the area supplied is 2 000 000 gallons; 1 500 000 gallons in winter. Thus the filters have only about one-fourth the required summer capacity. So far as their limited capacity allows, they furnish a perfectly satisfactory water from a hygienic standpoint.

"Experiments conducted during the investigation showed that on one occasion water taken direct from the lake at 100 feet from shore contained 1500 bacteria per c. c; passed through one of the filters only 450 bacteria per c. c. were found present. On another occasion the unfiltered water contained 300 and the filtered 200 bacteria to the c. c.; and on several occasions the filtered water contained only 100 to the c. c.

"None of the filtered water examined contained more than from one-fourth to less than one-half the number of bacteria (1000 to the c. c.) upon which the lake water is condemned bacteriologically.

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"The Rogers Park properly-filtered water is as pure as spring water and as healthful.

"It must be understood, however, that these experiments, including the preliminary cleansing of the filters, the addition of the necessary quantity of the alum, and all other details of operating the filters, were conducted by or under the direct supervision of the Director of the Laboratory and the Chief Chemist.

"From the foregoing it will be seen that the constructional defects of the Rogers Park water system are:

"1. Too close proximity of the intake to the shore. It should be extended to the 30-foot depth of water line.

"2. Lake-emptying sewers. These should be connected with the intercepting sewer system at once.

"The sewage of Rogers Park east of Clark street (from about 3000 families) is discharged into the lake through a sewer in Pratt Avenue, in a direct line with the intake. Two minor sewers—in Lunt and Farwell Avenues respectively—also discharge into the Lake. These sewers should be connected with the intercepting-sewer—as all others in the Rogers Park area have already been. Their output will not add materially to the volume now being pumped at the Lawrence Avenue sewage-pumping station. They must ultimately be so connected, when the intercepting-sewer system is completed—some time in January, 1907. Their immediate connection will remove the chief source of sewage pollution of the Rogers Park supply. Possibly Evanston sewage also reaches the Rogers Park intake; but of this there is no tangible evidence.

"3. A useless standpipe. Its maintenance is a demonstrated source of pollution of the already filtered water. It is a constant and increasing source of danger.

"When an unusual demand is made on the supply—as in case of a fire—water is pumped through this pipe direct

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from the bottom of the lake, without sedimentation or filtration. The interior of the pipe, as well as of the mains themselves, thus become polluted, and it may take weeks of the passage of filtered water before the pipe and mains are again cleansed. The standpipe should be abolished and the filtered water be pumped direct into the distributing mains, as is done in the eight city stations.

"4. Inadequate filter capacity and lack of care of those now in use. Their capacity should be quadrupled, even for the present summer demand. This is of the first and most urgent importance.

"The Rogers Park water supply, when properly filtered, is as good, at least, as that of any of the city water supplies —even under the constructional defects herein pointed out."

Water Now Pure.

Since the pumps of the Rogers Park Water Company were shut down and water from the Lake View pumping station was turned into the mains, the Rogers Park water has been as pure as the unpolluted Lake Michigan water remote from the shore, except the first week or so after the change, when there was some sediment of the old water left in the mains. On request from the HEALTH DEPARTMENT the City Engineer caused the hydrants to be flushed on or about September 21st, thereby removing the sediment. It was from this date on that the water was permanently unpolluted. The improvement effected by turning water from the Lake View station into the mains is demonstrated by a comparison of the albuminoid ammonia for July and for October. While in July the albuminoid ammonia in the filtered samples was once .014, three times .012 and twice .011 parts per 100 000, it never exceeded .008 parts per 100 000 in October. The water which is so remote from the shore that it cannot possibly be polluted by animal matter,

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such as sewage from the shore, has been showing continuously during the same season, on the filtered samples, the same amount of albuminoid ammonia as the Rogers Park water in October, therefore after the turning on of the Lake View water, viz: from .007 to .008 parts per 100 000. The excess of albuminoid ammonia in the filtered samples in July shows pollution from the shore, while no such pollution is shown in October, there being no such excess. Thus the improvement is evident.

In the unfiltered samples excesses occurred also in October in the Rogers Park water, it having been .012 and .011 parts per 100 000 on October 1st and 31st respectively. These excesses, however, are easily accounted for by the presence of live microscopic organisms in the unfiltered samples, and, therefore, do not indicate pollution from the shore. Even the unpolluted water remote from the shore sometimes shows such an excess of albuminoid ammonia. While the analysis of the unfiltered samples is incapable of determining the difference between this source of albuminoid ammonia and shore pollution, the excess of albuminoid ammonia in the filtered samples infallibly proves shore pollution, since mid-lake water, which is free from shore pollution, never shows an excess of albuminoid ammonia in the filtered samples, the dissolved nitrogenous matter being distributed uniformly throughout a vast body of water. Thus, while the excesses of albuminoid ammonia in the unfiltered samples in October failed to show shore pollution, those in the filtered samples in July prove shore pollution conclusively. At the same time, the absence of any excesses in the filtered samples in October shows absence of shore pollution, such as sewage, since sewage, being largely dissolved when mixed with vast quantities of water, would infallibly pass into the filtered samples and there produce excesses of albuminoid ammonia. This makes it certain

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that the excesses of albuminoid ammonia in the unfiltered samples in October were not due to shore pollution. The conclusion, therefore, is inevitable that in July there was pollution from the shore in the water, while in October there was none. In other words, the improvement of the water in consequence of the turning on of the Lake View water, September 13th, is clearly shown.

The averages of free ammonia and albuminoid ammonia in the filtered and unfiltered samples also show the improvement of the water, although the reduction of the albuminoid ammonia is not large. It cannot be expected to be large, because the quantity of shore pollution, being diluted with vast quantities of water, must necessarily be small before it reaches the intake. Thus, even the most dangerous typhoid sewage would increase the albuminoid ammonia but little. Evidently, then, subsequent removal of the pollution would decrease the albuminoid ammonia but slightly.

The reduction of the albuminoid ammonia as shown by the averages could not be large for the further reason that on some days in July the water was apparently not polluted, or not much. This, evidently, in calculating averages, brings down the figures for the albuminoid ammonia for July, causing them to approach the October figures.

The averages are as follows:

Month.	Averages in Parts per One Hundred Millions.			
	Unfiltered.		Filtered.	
	Free Ammonia	Albuminoid Ammonia	Free Ammonia	Albuminoid Ammonia
July, 1906.....	1.20	11.32	1.00	9.12
October, 1906.....	1.00	7.89	1.00	7.46

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These same results in parts per 100 000, giving five decimals in place of the usual three, for greater accuracy, are evidently as follows :

Month	Averages in Parts per One Hundred Thousand.			
	Unfiltered.		Filtered.	
	Free Ammonia	Albuminoid Ammonia	Free Ammonia	Albuminoid Ammonia
July, 1906.....	.00120	.01132	.00100	.00912
October, 1906.....	.00100	.00789	.00100	.00746

It will be noticed that the figures for the albuminoid ammonia are lower for October than July, thus showing the reduction spoken of herein above and the improvement of the water.

Weather Conditions.

The weather conditions will be found to corroborate my statements in certain cases. For instance, on October 31st, the wind was from the north, and on the preceding day it was from the south. Only west wind could carry the sewage which is discharged into the lake at the foot of Lawrence avenue, and which is the only sewage endangering the Lake View crib, to that crib whence the Rogers Park water was taken at that time. Hence there cannot have been any sewage pollution October 31st. As, in addition to this, the rain for those two days was insufficient to flush the sewer to such an extent that the contents could reach the Lake View crib, it is doubly certain that there cannot have been sewage pollution or any other pollution from the shore. This corroborates my conclusion stated herein above that the excess of albuminoid ammonia in the filtered samples of October 31st does not show shore pollution, but that it is due simply to micro-organisms of the larger and harmless varieties containing albuminoid substances. That micro-organisms were

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actually contained in the water in unusual quantity on that day is indicated by the fact that the velocity of the wind on October 31st and the day before was about thirty miles an hour. A wind of such velocity is sufficient to stir up the lake so it would contain sediment and micro-organisms, which generally go with the sediment, in quantity sufficient to produce the excess of albuminoid ammonia noted in the unfiltered samples. Thus the excess is easily accounted for, which constitutes additional corroboration of the statement I made above that an excess of albuminoid ammonia in the unfiltered samples does not prove shore pollution, that the filtered samples are the proper criterion to go by for the purpose of detecting shore pollution, and that, therefore, the Rogers Park water was unpolluted in October.

Most other statements which I made regarding the quality of the Rogers Park water supply may be verified to some extent by taking into consideration the direction and velocity of the wind and the quantity of precipitation or rain in the manner indicated.

Besides the direct comparison of the quantity of the albuminoid ammonia and the consideration of the meteorologic data, there is the comparison of the per cent of "safe" samples before and after the turning in of the Lake View water into the Rogers Park mains, which affords a means of judging to what extent the water was inproved by that change. Out of 221 samples of Rogers Park water tested between January 1, 1906, and September 21, 1906, when the sediment of the old water was removed by flushing the hydrants, 47 samples were found to be "unsafe," and 174 "safe." Therefore, 78.7 per cent of the samples were "safe." Out of 84 samples tested between September 22, 1906, and December 31, 1906, 3 samples were found "unsafe" and 81 "safe." Therefore, 96.4 per cent of these samples were found "safe" against only 78.7 per cent of the samples

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taken before the change. This evidently shows a material improvement.

Although the Lake View water was turned on September 13, 1906, I took the date of the flushing, September 21, 1906, as the date of the change, because the water in the mains was not pure Lake View water until the sediment of the old water had been removed by the flushing.

While a comparison of the percentages of "safe" samples is generally considered sufficient to determine the extent of improvement or deterioration of the water supply, I have given above a direct comparison of the albuminoid ammonia for the reason that it demonstrates the improvement with greater certainty than a comparison of the percentages of "safe" samples. Although the latter method of comparing the samples has the advantage of being based not on one analytical datum alone, but on all of them jointly, and also upon the meteorologic data to some extent, it lacks the mathematical precision of the direct comparison of the ammonias. It cannot be said to furnish an absolutely reliable conclusion, unless the method of framing the sanitary qualities of "safe" and "unsafe," which is to some extent a matter of opinion, is demonstrated to be correct. It was in view of these facts that I made the other comparison also, so as to eliminate any doubt regarding the effect of the turning on of the Lake View water upon the quality of the Rogers Park water.

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REPORTS OF DIVISIONS, BUREAUS, ETC.

DIVISION OF CONTAGIOUS DISEASES.
By HEMAN SPALDING, M. D., Chief Medical Inspector.

BUREAU OF ANTITOXIN ADMINISTRATION.
By FRANK X. WALLS, M. D., Medical Inspector.

BUREAU OF DISINFECTION.
By CHARLES W. BEHM, M. D., Chief of Disinfecting Corps.

BUREAU OF HOSPITALS AND AMBULANCES.
By GEORGE F. HUNT, M. D., Chief of Staff.

DIVISION OF SANITARY INSPECTION.
By PERRY L. HEDRICK, C. E., Chief Sanitary Inspector.

BUREAU OF FREE PUBLIC BATHS.
By E. R. PRITCHARD, Secretary.

CITY PHYSICIAN'S REPORT.
By JAMES F. TODD, M. D., City Physician.

FINANCIAL STATEMENT.
By E. R. PRITCHARD, Secretary.

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DIVISION OF CONTAGIOUS DISEASES.

HEMAN SPALDING, M. D., CHIEF MEDICAL INSPECTOR.

DURING the year ended December 31, 1906, 4457 cases of diphtheria (including croup) were reported to the DEPARTMENT OF HEALTH, and the number of deaths recorded from this disease in the same time was 574.

The number of reported cases of scarlet-fever was 5089; and the number of deaths resulting from this disease was 493.

Measles reported, 1154; and deaths from measles, 128.

Whooping cough reported numbered 113; and the deaths from this disease numbered 167.

Typhoid-fever cases reported, 248; deaths from the same disease, 370.

Tuberculosis cases reported, 277; deaths from tuberculosis, 3222.

It is well to state that the above figures cannot be used for computing the death rate of these diseases by comparing the number of deaths with the number of cases reported, for the reason that many cases are not reported to the DEPARTMENT OF HEALTH. Those who do not employ doctors and some forgetful doctors do not report cases.

Inspectors Needed.

It is to be hoped that we will be provided with an adequate force of inspectors next year. Not the least of the benefits to be derived from school inspection will be the uncovering of the hidden or unknown and undiagnosed cases of infectious diseases. Not many cases will escape

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the combined vigilance of school pupils, teachers and a hundred or more medical inspectors. If we secure the necessary number of medical inspectors next year, a comparison of the number of cases reported, with the number of deaths, will give an approximately correct estimate of the death rate in the acute infectious diseases.

On Assuming Responsibility.

There has been some criticism of the DEPARTMENT'S practice of permitting physicians to assume the responsibility of preventing the spread of contagion in cases where they will undertake to safeguard the public against infection in accordance with the instructions furnished by the DEPARTMENT OF HEALTH. When a physician will sign an agreement to follow such instructions, he is permitted to carry out the safety measures, and a warning card is not posted. He is supposed to assume the responsibility only in cases where he is certain a family will obey his instructions. It is charged that unscrupulous doctors without any intention of safeguarding the public health assume the responsibility in any and all cases, as a means of securing business, as the physician who is able and willing to relieve a family of the placard which is usually placed on the door is a desirable physician to employ. We find this charge to be true in some instances. No beneficent scheme can be devised which will not be abused by the unscrupulous.

It was further charged that when the physician attempted conscientiously to carry out proper methods of isolation and restrictions little heed was paid to his instructions. This is not often the case, and when it occurred the physician generally notified us to post a warning card and take charge of the premises. Aside from the first charge, which is well founded, the principal complaints have come from neighbors who were in no way exposed but wanted to see

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the card up on the other man's house. These would usually object to a card on their own houses, but were certain it was essential to have one on the neighboring house.

The practice of the DEPARTMENT in permitting physicians to become quasi-members of the DEPARTMENT OF HEALTH, and assist in safeguarding the public against disease was, when instituted, an advance step under the conditions upon which it was established. There was no adequate law to compel physicians to report infectious diseases and many physicians neglected to make reports. The posting of the warning card was unpopular, and to report a case was to have a card go up, and frequently the physician was dismissed from the case for reporting. The warning card was the stumbling block. There were times when more deaths were recorded than there were cases reported. The DEPARTMENT had but ten medical inspectors, and no aggressive work to hunt out concealed cases could be undertaken with such a force. The plan of enlisting the medical profession in the work was conceived and proposed.

The proposition reads as follows:

> If the attending physician will enforce measures against the spread of contagion or infection in any of these diseases he should so indicate by writing the word "ASSUME" in Entry No. 9.
>
> If this be done the DEPARTMENT will not placard the premises.
>
> If efficient precautions are not enforced the DEPARTMENT will resort to such measures as may be necessary—even to the extent of placarding and quarantining the infected premises.
>
> Absence of the word "ASSUME" in Entry No. 9 will be construed as a request to the DEPARTMENT to take action.
>
> When responsibility is assumed, the physician must cause neighboring families to be fully warned against the disease and must prohibit members of the infected family from exposing others to the risk of infection.

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The posting of a card is optional with the physician, but he must give in exchange for that privilege something worth more to the public than a warning card—vigilance and intelligent care in keeping the infection from others. The DEPARTMENT'S confidence in the medical profession was not misplaced, and the number of cases concealed by physicians rapidly decreased. The proportion of cases reported greatly increased, and has continued to increase to the present time. It would be unwise to abandon this practice under present conditions. With an increased force sufficient to establish systematic school inspection, we could do much of the work we now must leave to physicians.

By the help of the new ordinance and a large medical inspection corps, the practice of allowing physicians to assume the responsibility in infectious diseases could be abandoned.

Smallpox.

The number of cases of smallpox found in the City of Chicago during 1906 was 23, no deaths resulting from the disease. This is the remnant of the epidemic which has been almost continuous since 1899. Eleven of the 23 cases of smallpox were imported from surrounding cities and States. But two are known to have contracted the disease from these imported cases. This is owing to the fact that Chicago is well vaccinated. The total number of cases of smallpox treated in the Isolation Hospital from January, 1899, to December 31, 1906, is 2002; the total number of deaths from the same disease for this period is 147. Of the total number of cases, 306 had some kind of an old vaccination scar, but none had ever been re-vaccinated. A few cases found in the city not treated in the hospital makes the total number of cases in Chicago since January 1, 1899, 2010, with 148 deaths; 308 had been vaccinated and 1702 had never been vaccinated.

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Typhoid Fever.

At the close of the vacation season, the usual autumnal increase of typhoid-fever cases was noticed. The city water supply was known to be good, and the source of the typhoid infection had to be sought for elsewhere.

Investigations were made into all cases reported to the DEPARTMENT.

It was found that one-third of all cases contracted the disease in the country where they had gone to spend their vacation, or, in some instances, the victim had been away on a prolonged business trip.

In all other cases, where it was possible to trace the source of infection, it was found to come from infected milk, surface wells or impure ice.

At Mont Clare, families in which existed 22 cases of typhoid-fever obtained their milk from one source, a local dealer, whose outhouse vault was full level with the ground when examined. Typhoid-fever had existed in this man's family two years previous to this time. The well at this place was but 42 feet from the vault. There were plain indications that the well water had been used with which to wash the milk cans. This practice was ordered stopped, and the epidemic soon ended.

Other local outbreaks in the suburbs were traced to contaminated well water. A threat to put kerosene in the wells if they continued to use the water caused the owners to abandon the wells or thoroughly boil the water before using.

An outbreak of typhoid fever in Lincoln street and Hermitage avenue was interesting and instructive. The first two cases occurred in a family at 3632 Lincoln street. The next cases occurred in a family living at 3642 Lincoln street, over a dairy. The third family to become afflicted

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was the dairyman's family living at the same number on the lower floor. Three children were sick of the disease in the dairyman's family. It was learned that all these families were related and obtained milk from the dairy at 3642 Lincoln street, owned by the family last attacked by the disease. It was learned that this dairy was supplied with milk by two farmers, living near Lemont, Ill., the milk being shipped in from Lemont. An inspector was sent to these farms. His report reads as follows:

"I find the herd at the Krange Dairy Farm to consist of 30 cows, and he has been shipping from 5 to 7 cans of milk daily to the dairy at 3642 Lincoln street. The general surroundings at this dairy are rather unsanitary. The members of the family appear to be careless and untidy in their habits. The water supply, both for drinking and cleaning of utensils, is taken from two shallow wells, 7 and 11 feet deep, respectively; and both are very poorly situated—receiving the drainage from both the barn and the door-yard. There has been sickness in the family for the last two months; six of the children have been sick, and at one time about three or four weeks ago were attended daily by a physician, who called the disease typhoid fever and attributed the disease to the water."

The conditions at the other dairy—Mr. S. Kreuting—were found to be good, and there had been no sickness at this place. Shipping milk from the Krange Dairy was stopped until all unsanitary conditions were remedied. Comment on the above is unnecessary. It is a practical certainty that the typhoid infection was conveyed to Chicago from the Krange Dairy in the milk.

Antitoxin.

One of the most gratifying events of the year was the rmination of the Memorial Institute for Infectious

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Diseases to place on the market a superior quality of antitoxin at half the price charged by the commercial houses. No better antitoxin can be had at any price. When it became known that this Institute would furnish the DEPARTMENT OF HEALTH with antitoxin at 50 cents per 1000 units, the high price producers, who by concerted action had more than doubled the price to us, came on the run with offers to give us their best product at 50 cents per 1000 units. But it was too late. Such an offer from them would have been welcomed a year earlier. There was no interruption of our antitoxin work, because of the action of these not-in-the-business-for-health people, because the New York Board of Health came to our rescue and furnished us all we needed at the former low rate of cost. A personal visit from Dr. A. R. Reynolds, then COMMISSIONER OF HEALTH, secured from the New York Board of Health the supply which enabled us to furnish antitoxin to the poor without delay. The action of the New York Board of Health in furnishing us antitoxin at that time cannot be too highly praised.

The Memorial Institute has established in various parts of the City about 150 stations, where their product, put up in syringes, can be had for about half the usual charge for antitoxin. These stations will furnish antitoxin free to those too poor to pay for the remedy, and the DEPARTMENT OF HEALTH will replace the amount so given out. These stations are supplied by us with culture outfits for diphtheria for the convenience of physicians.

Vaccination.

Vaccination in Chicago has been persistently carried on during the year. In this work we have the co-operation of the intelligence of the City represented in the large mercantile houses, factories, railroads, hotels, city officials, ministers, priests, newspapers and the medical profession.

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Chicago has little to fear from smallpox, so long as the people are kept as well vaccinated as they are now. The unvaccinated, migratory persons, the new-comer, and the neglected children under the school age of six years, are the ones who contract smallpox. Opposition to vaccination in Chicago has nearly ceased. There are a few persons who get their information from the old sources, and will not listen to any information that is not 25 years old, who still think vaccination a delusion; but this class is growing smaller every year. Some of the worst of this class have been converted by having the recent facts about the subject presented to them. The DEPARTMENT used 108 170 tubes of vaccine lymph in 1906.

In combating diphtheria, the DEPARTMENT during 1906 gave 3 887 000 units of antitoxin to the needy poor, free of charge; of this quantity the medical inspectors administered 2 189 000 units. See table following for detailed statement of vaccine and antitoxin.

Infectious Disease Hospital Needed.

The DEPARTMENT is still without hospitals for isolating infectious diseases other than smallpox. If we could be as well provided with hospitals for diphtheria, scarlet-fever, measles and whooping cough, as we are for smallpox, the death rate from these diseases could be substantially reduced. Cook County has a fine hospital for infectious diseases, which accommodates a limited number of the poor; but many object to going to Cook County Hospital though they would readily go to a hospital owned by the city. Those able to pay could do so and the announcement that pay patients would be received takes away the stigma attached to a charity hospital. No one who lives within the city limits pays at the smallpox hospital, and yet no one thinks it a charity hospital. Indeed, the ordinances say they must pay,

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if able to do so. Mention Cook County Hospital to those in need of a hospital and objections are raised on the ground that it is for paupers; and many who should go to a hospital for the safety of the neighborhood, refuse to go because they do not wish to be classed with paupers. They will readily accept charity in a pay hospital. This is one reason among many why a city isolation hospital for the various infectious diseases is needed. Often we find a child with diphtheria, scarlet-fever or measles in the midst of scores of children, in closely crowded rooms and flats, where exposure to disease is certain. We could take such to an isolation hospital if we had one and prevent the certain spread of the disease to others.

Medical School Inspection.

Hospitals for infectious diseases, and medical inspectors to begin medical school inspection and supervision, are the two great needs of the DEPARTMENT OF HEALTH at the present time. Medical school inspection and supervision is a necessity. Chicago can no longer do without such a service. We are already behind the rest of the enlightened world in this matter. In some countries medical school inspection is compulsory—made so by laws enacted. About 260 000 children are legally compelled to attend school, and there is hardly a school into which contagious and infectious diseases do not enter and imperil the lives of the pupils. This peril is beyond the control or knowledge of the parents. Add to these 260 000 the number attending the parochial schools, and we have over 300 000 children in school, where they may be visited at any time by a child convalescing from a contagious disease, covered with infecting germs which not infrequently communicate diseases resulting in death. If the law forces children into these schools, someone should provide for the protection of their health while

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there. Chicago now is without school inspection, and the children are falling victims to infectious diseases daily; and the infection reaches them in most instances in the school house. With an adequate force of medical inspectors nearly all of these exposures could be avoided. The Chicago DEPARTMENT OF HEALTH was one of the first to recognize the importance of school medical inspection, and in 1896 established a school medical inspection service, with a ridiculously inadequate force of inspectors. Boston anticipated this service by a year. In 1900 the Board of Education assumed "administrative jurisdiction" of school inspection and appointed fifty medical school inspectors at a salary of $50.00 per month. This service lasted five months, and, inadequate as it was in numbers, was of great service in keeping infectious diseases out of the schools. These inspectors, under the direction of the Board of Education, had no jurisdiction outside the school-house grounds, and their usefulness was impaired to some extent. All school medical inspectors should be medical inspectors in the DEPARTMENT OF HEALTH. They then have jurisdiction over a child with an infectious disease anywhere found. They can go to the house and safe-guard the public health without waiting to notify the DEPARTMENT OF HEALTH to send an inspector, as was the case with the men directed from the Board of Education. After five months' service forty of the school inspectors were discharged, because of scarcity of money with which to pay salaries. Ten were kept as an emergency corps to go to the schools when called by the principals. Even this service was abandoned by the Board of Education at the beginning of the Fall term.

The DEPARTMENT OF HEALTH has but fourteen inspectors for all work and school inspection, of course, is out of question with such a force. We can begin aggressive work in the schools if we can have 100 men—150 would be better.

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Boston has eighty medical school inspectors. Supervision of the health of school children will naturally follow school medical inspection. To recognize the physical or mental defects of a child, and point out to parents the needs for the betterment of mind and body, will sooner or later be a part of the medical school inspector's duty. This is a higher development of the school medical inspection, the importance of which is in full view of those who have thought much upon the subject. Chicago must have this medical school inspection re-established, and on a generous scale in keeping with her greatness in other things.

The following tables show in detail some of the work accomplished by the Division of Contagious Diseases:

SUMMARY OF VACCINE LYMPH DISTRIBUTED FOR CHARITY AND SCHOOL VACCINATIONS BY DIVISION OF CONTAGIOUS DISEASES.

Compiled by I. D. RAWLINGS, M.D., Ass't Chief Medical Inspector.

	Public Vaccinators.	Free Dispensaries.	Physicians for Free Vaccinations.	Medical Inspectors.	Total by months.
	TUBES.	TUBES.	TUBES.	TUBES.	TUBES.
January	6 890	1 220	390	330	8 830
February	6 710	560	300	50	7 620
March	5 640	530	640	120	6 940
April	9 230	1 230	620	50	11 130
May	9 470	1 630	990	320	12 410
June	5 840	660	540	380	7 420
July	750	40	1 140	280	2 210
August	930	70	940	240	2 180
September	210	630	40	20	900
October	28 740	850	1 660	180	31 430
November	9 020	470	500	80	10 070
December	6 170	440	230	190	7 030
Totals	89 610	8 330	7 990	2 240	108 170

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SUMMARY OF MEDICAL INSPECTIONS, INVESTIGATIONS, ANTITOXIN ADMINISTRATIONS, ETC., MADE DURING YEARS 1905-1906, BY MEDICAL INSPECTORS.

Compiled by I. D. RAWLINGS, M. D., Assistant Chief Medical Inspector.

Medical Inspections.	Smallpox Suspects.		Antitoxin Calls.		Complaints.		Special Investigations.		Miscellaneous Calls.		Total Calls by Months.	
MONTHS.	1905	1906	1905	1906	1905	1906	1905	1906	1905	1906	1905	1906
January.....	118	26	35	57	19	77	1	8	.....	8	173	176
February.....	128	19	28	63	20	64	2	11	.....	6	178	163
March.....	149	15	36	74	21	88	1	14	.....	9	207	200
April.....	92	17	29	49	15	72	2	10	.....	8	138	156
May.....	100	35	20	63	16	75	.....	21	2	4	138	198
June.....	114	15	33	61	15	67	.....	9	1	9	163	161
July.....	39	14	28	51	12	37	2	12	.....	5	81	119
August.....	19	6	18	70	10	57	1	23	4	11	52	167
September.....	11	5	30	55	14	69	4	31	2	12	61	172
October.....	11	8	43	66	21	107	.....	40	1	10	76	231
November.....	15	8	64	110	32	210	2	30	3	18	116	376
December.....	21	20	68	70	37	299	4	7	1	3	131	399
Total.....	817	188	432	789	232	1222	19	216	14	103	1514	2518

REMARKS: The above summary represents only the original calls and does not include the many return calls that must be made by our Inspectors, especially in the intubated cases of diphtheria and also other contagious cases where there is no attending Physician. A large number of secondary calls must be made after each original smallpox call. The following up and subsequent visits to those exposed does not show in this report.

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ANTITOXIN DISTRIBUTED BY THE DIVISION OF CONTAGIOUS DISEASES DURING 1906.

MONTHS.	SOLD.			CHARITY.					
				Medical Inspectors.			Attending Physician.		
	3000 Units.	2000 Units.	1000 Units.	3000 Units.	2000 Units.	1000 Units.	3000 Units.	2000 Units	1000 Units.
January.....	46	33	17	87	57	64	111	36	65
February.....	26	20	10	83	40	45	50	14	16
March.....	19	11	6	90	62	57	57	39	29
April.....	10	6	1	56	56	35	48	16	25
May.....	19	24	5	80	46	47	52	46	39
June.....	12	8	1	65	67	40	46	29	43
July.....	13	6	4	60	28	32	50	8	18
August.....	20	16	9	89	33	24	32	11	14
September.....	21	29	5	63	60	27	70	38	56
October.....	9	4	1	95	36	32	106	79	56
November.....	24	17	6	134	88	87	128	39	45
December.....	17	13	4	110	49	65	99	45	43
Total.....	236	187	69	1012	622	555	849	400	449

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SUMMARY OF SMALLPOX CASES, TREATED IN THE ISOLATION HOSPITAL FROM JANUARY 1, 1899, TO JANUARY 1, 1907.

Compiled by I. D. RAWLINGS, M. D., Assistant Chief Medical Inspector.

YEAR	1899	1900	1901	1902	1903	1904	1905	1906	TOTAL.
Smallpox	25	54	276	335	385	358	546	23	2002
Deaths	1	2	4	4	47	28	61	0	147
Vaccinated	1	4	39	21	50	47	142	2	306
White Males	16	40	203	149	170	191	358	15	1138
White Females	8	13	27	69	146	138	150	2	566
Colored Males	1	1	37	105	55	21	21	5	246
Colored Females	0	0	9	12	14	7	8	1	51
Under 5 years old	2	2	5	28	83	91	99	1	311
From 5 to 10 years old	1	1	3	15	28	29	57	2	136
10 to 20	2	5	27	41	33	29	43	2	182
20 to 30	14	25	138	170	131	105	144	12	739
30 to 40	5	14	64	50	72	65	201	4	475
40 to 50	0	6	21	24	25	27	58	2	162
50 to 60	0	0	11	6	10	6	31	0	64
60 to 70	0	1	6	1	2	2	9	0	21
70 to 80	0	0	1	1	1	2	2	0	7
80 to 90	0	0	0	0	0	1	0	0	1

REMARKS: Patients under treatment on January 1, 1907 .....2.

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SUMMARY OF THE DISEASES REPORTED TO THE DIVISION OF CONTAGIOUS DISEASES, DURING THE YEARS 1904, 1905 AND 1906.

Compiled by I. D RAWLINGS, M. D., Assistant Chief Medical Inspector.

	January.			February.			March.			April.			May.			June.			July.			August.			September.			October.			November.			December.			TOTALS.		
	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906	1904	1905	1906
Diphtheria	313	262	475	245	217	339	172	189	348	143	193	273	125	140	301	152	144	272	127	152	229	130	110	181	150	249	286	290	438	530	376	461	613	384	346	610	2607	2901	4457
Scarlet Fever	215	109	458	197	103	383	189	94	478	167	85	527	105	71	513	91	72	489	41	57	284	42	52	213	45	41	270	84	79	369	129	145	519	110	198	586	1416	1106	5089
Smallpox	11	78	2	5	77	1	25	95	1	24	75	7	28	87	7	8	84	1	32	35	....	25	9	2	22	3	....	59	3	....	79	....	....	59	....	2	377	540	23
Measles	18	69	100	32	100	101	25	119	198	23	104	196	24	97	196	29	72	107	13	49	43	5	3	10	7	3	9	17	2	20	31	14	56	35	18	118	259	650	1154
Chickenpox	1	5	54	3	1	30	2	....	37	....	1	21	1	....	14	4	2	2	2	...	2	....	.....	.....	1	....	5	1	2	4	7	5	14	....	3	9	22	19	192
Typhoid	21	8	26	18	10	36	19	21	23	16	14	17	11	10	22	14	15	11	17	10	9	37	31	14	22	26	24	23	12	39	33	16	18	15	11	9	246	184	248
Whooping Cough	2	15	22	1	28	7	4	13	5	....	6	7	1	8	12	3	5	4	....	8	7	1	7	4	1	4	22	5	....	3	1	10	18	8	1	2	27	100	113
Tuberculosis	....	1	76	....	....	50	.....	.....	30	.....	.....	31	.....	.....	26	1	....	12	.....	.....	14	....	...	9	....	....	9	.....	.....	8	.....	1	6	.....	.....	7	1	2	277
Others	2	5	10	11	...	2	2	2	14	2	2	3	.....	.....	5	4	1	1	6	1	....	.....	.....	1	....	....	1	4	1	....	3	7	11	....	6	11	34	25	59
Totals	583	552	1223	512	536	949	438	533	1134	375	480	1082	296	413	1096	306	396	899	238	307	588	240	212	434	248	326	626	483	537	973	659	659	1255	611	583	1354	4589	5533	11613

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BUREAU OF ANTITOXIN ADMINISTRATION.

FRANK X. WALLS, M. D., MEDICAL INSPECTOR.

AT THE present day there is but one treatment for diphtheria—the subcutaneous administration of diphtheria antitoxin at the earliest possible moment. If a sufficient amount of antitoxin be administered to an individual suffering from diphtheria on the first day of the disease, there is no mortality and the illness is so promptly recovered from that other treatment is rarely necessary, but when the disease has existed for two, three, four or more days it may be that the later administration of antitoxin will be impotent to prevent a lethal termination.

When we consider there is absolutely no contraindication to the administration of antitoxin, then it becomes imperative in every case of suspected diphtheria to give the patient the benefit of a certain cure by administering the antitoxin of diphtheria at the earliest moment and establish the diagnosis by culture later.

It may happen in true diphtheria that a culture is negative either because the material taken from the patient did not happen to contain the bacilli of diphtheria or that the culture media was not nutrient for the organism. In a case of mine where the diagnosis of diphtheria seemed warranted clinically it was not until the third culture had been taken that the diagnosis was confirmed bacteriologically.

Diphtheria occurs often enough in localities other than the usual one on the tonsils and fauces, and when it begins in the nares, nasopharynx, larynx, lower in the respiratory tract or on other mucous or other subcutaneous surfaces the diagnosis may be difficult and may be delayed for some

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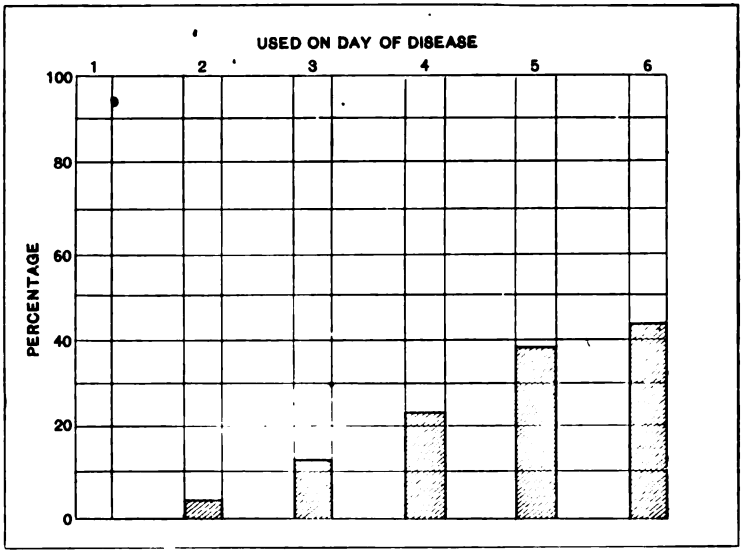
days, during which time an overwhelming toxemia may be established.



This diagram from J. Trumpp's article on diphtheria in Pfaundler and Schlossman's Handbuch der Kinderheilkunde graphically illustrates the value of the serum when used on the different days of the disease. The dark shading in the upright columns shows the mortality percentage of diphtheria; no mortality in cases treated on the first day of the disease, with a step-like ascent until a mortality of over 50 per cent is reached in cases not treated with antitoxin before the sixth day.

Dosage.

In the last Annual Report of the DEPARTMENT the dosage of diphtheria antitoxin was given as follows:

The amount of antitoxin used for each case has varied between 2000 and 20 000 units, according to the age of the patient and the severity of the disease. In cases of moderate severity of faucial diphtheria in infants as a minimum

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dose 2000 units was generally given. Beyond infancy 3000 units was the usual initial dose. In such cases a single injection sufficed to produce within twelve hours an arrest of the progress of the disease; within twenty-four hours exfoliation of the membrane had begun, and within forty-eight to seventy-two hours the exudate had entirely disappeared.

In severe cases an initial dose of 5000 to 10 000 units was administered, and in some cases the antitoxin was repeated in smaller dosage if only slight improvement were noted, or equal or larger dosage if no improvement was evident.

In the malignant cases with ashy pallor or leaden hue, with extensive membranes that were thick and foul smelling, with extensive infiltration of the tissues of the neck, rapid pulse and air hunger, large doses repeated every twelve hours were administered. Such cases if not moribund were advised to go to the hospital, though rarely was this advice followed as parents, believing the cases hopeless, preferred if their children were to die not to distress them by removing them from home.

In the laryngeal cases the average primary dose was 5000 units, and this was repeated in twenty-four hours if the laryngeal symptoms had not abated. As a consequence of this treatment the rule was in cases of laryngeal diphtheria of moderate severity—that is, when there was only hoarseness or alteration of the voice without dyspnoea—a cure without the necessity of intubation. In cases in which, in addition to alteration of the voice, a slight degree of dyspnoea existed, 5000 units were given, then repeated in twelve hours, and in about three-quarters of such cases intubation was avoided and in only one-fourth of such cases did asphyxiation demand an O'Dwyer tube.

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Some observers advocate the administration of large doses of antitoxin, 10 000 to 50 000 units, for the treatment of the sequelæ of diphtheria such as neuritis, myocarditis, nephritis, etc., offering as an explanation of the exhibition of large dosage in the sequelæ the possibility that toxins may be forcibly dragged and eliminated from their union with the protoplasm of the host by the antitoxin.

Serum Symptoms Innocuous.

There may result from the administration of diphtheria antitoxin certain symptoms that for a short time may be distressing, but never are serious, and which are termed serum disease.

The symptoms are due to the administration of the foreign albumin in the serum of the horse and are not caused by the antitoxin as such. According to Picquet the reaction to the injection of serum is dependent upon (1) the individual and (2) the amount of serum injected. The symptoms of serum disease occur from seven to fourteen days after the administration of the serum. During the week to fortnight there are no symptoms. If any reaction occurs earlier it is probably due to certain preservative substances that may have been used with the serum.

After a period of from seven to fourteen days, there may be slight fever, some enlargement of the lymphatic glands—usually more marked in the chain near the site of injection—and there may be a general oedema without any evidence of nephritis. Urticaria is not uncommon; later and more unusual there may be a morbiliform or scarlatiniform exanthem. Pain in the neighborhood of the joints and in the joints may occur, but without other evidences of arthritis.

These symptoms are quite transient and with the use of concentrated sera are reduced to a minimum.

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TABLE OF 8372 CASES OF BACTERIALLY-VERIFIED DIPHTHERIA TREATED WITH ANTITOXIN BY THE CHICAGO HEALTH DEPARTMENT, BETWEEN OCTOBER 5, 1895, AND DECEMBER 31, 1906.

Showing the number treated on different days of the disease, and proportion (per cent) of these to total treated— Number of deaths and mortality (per cent) of each day's group— Total deaths and mortality (per cent) of the total of each year and of the entire period.

PERIOD.	Totals Treated.	BY DAYS OR STAGE OF DISEASE WHEN CASES WERE FIRST INJECTED WITH ANTITOXIN.																				Total Deaths.	Mortality Per Cent.
		NUMBER TREATED ON					PER CENT OF TOTALS TREATED ON					DEATHS AMONG THOSE TREATED ON					MORTALITY PER CENT OF THOSE TREATED ON						
		1st Day.	2d Day.	3d Day.	4th Day.	Later.	1st Day.	2d Day.	3d Day.	4th Day.	Later.	1st Day.	2d Day.	3d Day.	4th Day.	Later.	1st Day.	2d Day.	3d Day.	4th Day.	Later.		
Oct. 5 to Dec. 31... 1895 1896	2297	168	529	1044	382	174	7.3	23.0	45.4	16.7	7.6	....	8	29	57	57	.....	1.51	2.77	1.49	32 7	151	6.57
Jan. 1 to Dec. 31... 1897	866	126	246	221	147	126	14.6	28.4	25.5	16.9	14.6	1	6	17	8	28	0.78	2.43	7.69	5 44	22.2	60	6.93
Jan. 1 to Dec. 31... 1898	709	54	206	182	141	126	7.6	29.0	25.7	19.9	17.8	....	3	8	12	29	.....	1.45	4.39	8 51	23.0	52	7 33
Jan. 1 to Dec. 31.. 1899	966	71	227	305	183	180	7.3	23.5	31.6	18.9	18.7	...	4	12	19	34	.....	1.76	3.93	10.38	18.89	69	7 14
Jan 1 to Dec. 31... 1900	889	57	218	282	184	148	6.4	24.5	31.7	20.8	16.6	1	1	7	22	26	1.76	0.46	2.48	11.96	17.57	57	6.41
Jan. 1 to Dec. 31... 1901	557	49	154	188	103	63	8.6	27.6	31.9	18.4	11.2	....	1	5	10	19	.....	0.64	2.65	9.70	30.15	35	6.28
Jan. 1 to Dec. 31... 1902	639	31	177	225	137	69	4.8	27.7	35.3	20.9	10.6	....	3	3	10	10	.....	1.73	1.33	7.29	14.49	26	4.07
Jan. 1 to Dec. 31... 1903	513	30	158	172	103	50	5 8	30.7	33.5	20.0	9 7	....	3	6	13	15	.....	1.89	3.48	12.62	30.00	37	7.21
Jan. 1 to Dec. 31. 1904	320	16	88	97	71	48	5.0	27.5	30.3	22.1	15.0	....	..	1	7	6	.....	.....	1.03	9.43	12.5	14	4.37
Jan. 1 to Dec. 31... 1905	247	6	60	86	45	50	2.4	24.2	34.8	18.1	20.2	....	3	4	7	4	.....	5.00	4.65	1.55	8.0	18	7.85
Jan. 1 to Dec. 31 .. 1906	369	16	118	124	82	29	4.3	31.9	33.3	22 2	7.8	....	1	7	11	6	.....	0.84	5.64	13.4	20.6	25	6.77
Totals and Percentages	8372	624	2181	2926	1578	1063	7.5	26.1	34 9	18.8	12.7	2	33	99	176	234	0.32	1.51	3.38	11.15	22.01	544	6.50

Total cases intubated October 5, 1895, to December 31, 1906, 784. Total intubated cases recovered, 556. Per cent of intubated cases recovered, 70.6. Per cent died, 29.4. Total number of exposed treated with immunizing dose of antitoxin, 9146. Total number subsequently attacked with diphtheria (all recovered), 51. Per cent of cases subsequently attacked, 0.57.

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REPORT OF THE BUREAU OF DISINFECTION.

By Chas. W. Behm, M. D., Chief of the Disinfection Corps.

Disinfection after cases of contagious diseases is made compulsory by ordinance, and is performed either at the option of the attending physician himself, or by the regular Health Department disinfectors. If left to the attending physician it must be performed to satisfy the minimum requirements of the Department of Health.

Duty of Attendant.

To be properly done, disinfection should commence as soon as an attendant is called to a communicable disease, and every measure should be taken to prevent the dissemination of infection. This not only protects the attendant but lessens just that much the requirements for final disinfection. Thus the attendant's duties include the supervision of the habits of the patient as well as disinfection of his excretions and of infected bedding, linen, dishes and other articles brought in contact with the patient. Not the least of his duties is to avoid carrying infection himself.

Disinfection is a subject every attendant should preach the moment he even suspects a communicable disease, but, to one's sorrow, many attendants relegate this subject to the supposed knowledge of the family or leave the responsibility entirely with the sanitary official. Knowledge on the subject of the spread of contagious disease is sadly lacking even among people otherwise well informed, and technical knowledge of disinfection is still more rare. Many physicians whose moral and humane duty it should be to educate

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their patients, seldom find time to give instruction as to contagion and its destruction. Others neglect it. If they do give instructions little heed is given unless the subject is forcibly impressed both by precept and example. The disregard by the general public for the spread of contagion is astonishing. Where in other matters they exercise a certain amount of prudence, in contagious diseases even that little prudence is scattered to the four winds. But when the matter is brought home to the family in the form of sickness or death, either someone's carelessness is roundly cursed or the subject is dismissed with the resignation of the fatalist.

Circular of Information.

It was to fill the educational gap that the DEPARTMENT has published a pamphlet, entitled "Information for the Family in Case of Contagious Diseases," which describes in very simple, lucid language the duration and management of contagion, and gives rules for the proper procedure after the termination of the case, by recovery or death, including disinfection. This pamphlet is sent to each family from which a contagious disease is reported. That it is quite generally read is assumed from the frequency with which requests are received for additional information or details. Still, this circular does not entirely fill its intended mission, as its admonitions are forgotten in the daily care of the patient. However, editions of the circular in foreign languages would add materially to its usefulness. Education in the methods of disinfection needs an "uplift." The market is flooded with alleged disinfectants which are pushed by energetic salesmen and bought by the unwary. Even physicians are led to purchase and recommend some of these alleged disinfectants, deceived by the plausible claims of their promoters. A disinfectant, for general use, must be a germicide admitting of various methods of application. To

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properly disinfect, there are certain definite requirements. To go below these essentials is to defeat the object sought. The use of methods and materials not recognized as efficient by the DEPARTMENT, after cases of infectious disease, is the principal cause of friction between physicians and the DEPARTMENT. Just as a physician holds his prescription sacred, and that a criticism thereof is sacrilege, so, likewise, some physicians will not tolerate criticism of their disinfection, as that would depreciate their knowledge in the estimation of the family. Disinfection, if done by the physician or the family, must be done in a manner satisfactory to the DEPARTMENT disinfector, or it is done again by the official staff.

Time for Disinfection.

Now comes the question, when shall disinfection be performed? The best authorities agree substantially, but opinions vary and are often influenced by sentiment. When a family has been quarantined some time it importunes the physician to remove the restrictions because other members are kept from home, or from school, or the quarantine is inconveniencing the family. Finally (as is often admitted) the physician is persuaded against his judgment to ask for disinfection.

Under these absurd conditions it is purely sentiment that prompts the request. In other cases physicians are absolutely indifferent as to whether disinfection is performed or not, leaving the DEPARTMENT to find out the termination of the disease and then to disinfect. Leaving sentiment aside we find that opinions vary as to the termination of the various diseases. Apparent well-being constitutes no criterion. The disinfector in many instances will have to rely on the honesty of the statements made to him by the family, and the evidences of disease or complications, or of scaling after scarlet fever. As the majority of disinfectors are

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medical men or men of such long training, these are questions which are usually decided before disinfection takes place.

Looking over a series of 300 disinfections it was found that the disinfection was performed 7½ and 28 days after the report of cases of diphtheria and scarlet fever respectively. Allowing at least 4 days between the finding of the cases and the report to the DEPARTMENT, this gives 11½ and 32 days respectively. In either case the period is far too short.

Negative microscopical examination and the absence of complications in diphtheria should be the requirement for disinfection. In scarlet fever the termination of scaling is the only safe guide, no matter how prolonged. This rule constitutes the safest procedure, but is not always to the satisfaction of the family or physician. During the year (to Dec. 1st) the DEPARTMENT had to follow up reported cases in 1458 instances where the attendant failed to report the termination of the disease. Of these, 882 were scarlet fever and 576 diphtheria. In these cases, a disinfector was sent out 20 and 35 days after the report of cases of diphtheria and scarlet fever respectively, for disinfection. In 82 per cent of these cases disinfection was performed or enforced by the DEPARTMENT official. The remaining cases either had been satisfactorily disinfected or for some reason could not be disinfected on the first call.

Statistics.

During the year there were 8038 disinfections performed, which is 87 per cent increase over the year 1905. This increase was due first and mainly to the general increase of contagious diseases: 2d, to following up cases which were not terminated by the attending physician: 3d, to requiring a higher standard of disinfection. The cubic contents of air space disinfected was 34 213 818 cubic feet, or 100 per cent

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over last year. The disinfectors made 2742 trips where disinfection could not be performed on the first visit on account of the following reasons: Still sick, 531; still peeling, 1020; not home, 492; not ready, 200; wrong address given, 405; refusals for disinfection, 94; total, 2742 trips. 1602 trips were made where disinfection was performed by the attending physician and passed upon as satisfactory. These totals added to the trips where disinfection was performed make a total of 12 382 trips. This increase necessitated more than doubling the regular staff of disinfectors and then frequently the work was very much behind. Refusals to allow the DEPARTMENT to disinfect compelled the disinfectors in a number of instances to call police assistance before the work could be accomplished. Frequently it takes most of a disinfector's time trying to convince people why it is necessary to disinfect. While, if compulsion is necessary to enforce disinfection, it generally incurs the enmity of the physician. Surely, in these cases, had the physician informed the family of the necessity for disinfection, no trouble would have ensued.

Methods of Disinfection.

Experiments of various kinds were tried testing different methods of disinfection, but the results in actual house disinfection were as satisfactory with the present method as with the various others advocated. It was further found that using the sheet method the proper appliances were to be found more often than when experiments were tried with the permanganate-formalin method. The unusual dearth of proper utensils in the infected houses for the mixture of the chemicals was one great drawback. Only an occasional house had sufficient large cans or buckets, viz., one for each 1000 cubic feet to be disinfected. To find enough sheets for the disinfection of large residences is

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generally an easy matter. Bacterial tests were also favorable to the sheet method which gave a greater percentage of killed specimens than the permanganate-formalin method. Tests were conducted in houses where it was possible to divide the house in halves and work under similar conditions with both methods. Hence the decision that the sheet process is still the simplest and best. The permanganate-formalin reaction liberates free nascent oxygen which acts chemically like the fumes of SO_2. While not as active, still the nascent oxygen bleaches various fabrics frequently found in houses, especially where there is any degree of moisture. One complaint made concerning the experimental work with permanganate-formalin was that colored dress goods were "striped" during the process of disinfection. If it happened once it will occur again. Summing up, the method as now followed by the DEPARTMENT is as follows:

The room to be disinfected* is sealed and prepared as usual for sulphur disinfection, by pasting strips of paper over cracks of doors and windows. All its surfaces are exposed as much as possible; closet doors are opened and their contents together with the contents of drawers are removed, scattered about and the drawers left open; mattresses are set on end; pillows, bedding, clothing, etc., are suspended from lines stretched accross the room or spread out on chairs and other objects so as to expose all sides; books are opened and the leaves spread—in short, the room and its contents are so disposed as to secure free access of the gas to all parts as fully as possible.

For every 1000 cubic feet of space in the room, suspend by one edge an ordinary bed sheet (2x2½ yds.) from a line stretched across the middle of the room. Properly sprinkled this will carry without dripping eight (8) ounces of formalin

* Circular: Information for the Family in Case of Contagious Diseases.—CHICAGO HEALTH DEPARTMENT.

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—the 40 per cent solution of formaldehyd gas—which is sufficient to disinfect 1000 cubic feet of space. As many sheets as necessary are used, hung at equal distances apart. The ordinary rather coarse cotton sheet should be used in order to secure rapid evaporation. The house should remain sealed not less than eight hours.

A rosehead sprinkler used by florists can be used for sprinkling the sheets.

The practice of burning a few sulphur candles in the house does no good and should be abandoned.

DIVISION OF CONTAGIOUS DISEASES—BUREAU OF DISINFECTION.

TABLE SHOWING WORK PERFORMED BY DISINFECTORS AND TRIPS MADE WHERE DISINFECTION COULD NOT BE PERFORMED ON FIRST VISIT.

1906	Sick.	Peeling.	Wrong No.	Not Ready.	Not Home.	Refused.	Total.	Found Done.	Disinfections.	Total Trips.
January	33	50	29	17	16	....	145	80	668	893
February	40	70	36	17	39	6	208	171	639	1018
March	46	90	37	26	34	11	254	141	682	1077
April	48	85	26	23	42	8	232	140	629	1001
May	52	91	20	31	44	3	241	153	796	1190
June	48	118	36	13	42	8	265	122	668	1055
July	28	83	36	17	64	12	240	132	749	1121
August	28	70	36	9	52	13	208	114	487	809
September	23	46	25	.....	26	5	125	93	417	635
October	36	84	26	13	43	7	209	120	624	953
November	72	111	56	15	39	8	301	157	840	1298
December	77	122	42	9	51	13	314	179	839	1332
Total	581	1020	405	200	492	94	2742	1602	8038	12 382

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Division of Contagious Diseases—Bureau of Disinfection.

1906	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for Year.
Reported Cases—													
Diphtheria	475	339	348	273	301	272	229	181	286	530	613	610	4 457
Scarlet-Fever	458	383	478	527	513	489	284	213	270	369	519	586	5 079
Smallpox	2	1	1	7	7	1		2					23
Measles	100	101	196	196	196	107	43	10	9	20	56	118	1 154
Whooping Cough	22	7	5	7	12	4	7	4	22	3	18	2	113
Typhoid-Fever	26	36	23	17	22	11	9	14	24	39	18	9	248
Tuberculosis	76	50	30	31	26	12	14	9	9	8	6	7	278
Others	64	32	51	24	19	3	2	1	6	4	25	20	251
Total	1 223	949	1 134	1 082	1 096	899	588	434	626	973	1 255	1 364	11 613
Premises Carded—													
Diphtheria	274	229	165	130	157	150	125	70	140	278	305	378	2 491
Scarlet-Fever	293	244	243	219	241	250	135	100	130	190	301	294	2 643
Smallpox													
Others													
Total	567	473	408	349	398	400	260	170	270	468	699	672	5 134
Disinfections Performed—													
Diphtheria	342	297	289	229	297	219	318	180	193	334	499	440	3 637
Scarlet-Fever	287	306	365	348	439	425	405	270	191	238	300	370	3 944
Smallpox	4	2	1	11	11			2				3	34
Measles	3	1	1	2	2						2		11
Tuberculosis	30	31	24	34	41	24	26	33	32	50	38	26	389
Others	2	2	2	5	6			2	1	2	1		23
Total	668	639	682	629	796	668	749	487	417	624	840	839	8 038
Cubic Feet Disinfected	2 119 230	2 294 004	2 914 720	2 976 080	4 098 632	2 744 410	2 134 062	2 121 600	1 775 500	2 745 400	4 136 280	4 153 900	34 213 818

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BUREAU OF HOSPITALS AND AMBULANCES.

GEO. C. HUNT, M. D., MEDICAL INSPECTOR OF HOSPITALS.

SINCE the amendment of the Hospital Ordinance passed February 26, 1906, went into effect, there has been a great improvement in the general condition and conduct of hospitals, and a marked diminution in the number of complaints entered in this office against hospitals. As a consequence, the Bureau of Hospital Inspection has been enabled to devote more of its time to the enforcement of the ordinances regulating the establishment and maintenance of hospitals in this city, and a corresponding improvement in the general condition of hospitals, and more complete and satisfactory reports have become apparent.

Increased License Fee.

The increase of the license fee from $10.00 to $100.00 has resulted in the discontinuance of a number of small and irresponsible institutions and a more strict observance of the terms of the ordinance by the institutions which still survive. Of the 67 hospitals in the City of Chicago which are required by law to take out a license, 65 have complied with the law; one claims to have sent its check to the City Collector—the matter is now being investigated—and one has been turned over to the law department for action.

Statistics.

The total number of cases of all kinds treated during the year as per the complete monthly reports of all hospitals coming under our jurisdiction was 80 552, a monthly average of 6712; the percentage of deaths from all causes

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during the year was 4 per cent; the total number of medical cases was 26 404, with a death rate of 6.5 per cent; total number of surgical cases was 40 497, with a death rate of 3.3 per cent; total number of obstetric cases was 4759, with a death rate of 1.4 per cent; total number of gynecologic cases was 8739, with a death rate of 1.3 per cent.

This showing of a death rate of only 40 to the 1000 in a population which is larger than the average city in this country, and which consists entirely of those who are, as a rule, seriously ill, compares very favorably, indeed, with the death rate of 14.18 per 1000 in the whole city of Chicago, admittedly one of the healthiest cities of the world. Again, taking the surgical and gynecologic cases (which are really surgical), we find that the death rate of the two combined is 29.6 per 1000. Compare this with a death rate of 65 per 1000 for medical cases reported and we are forced to the conclusion that surgery has made tremendous gains over the inexact science of medicine.

Hospitals to Aid Coroner.

A great deal of criticism has appeared lately in the daily papers regarding the admission and treatment in hospitals of cases of infection and peritonitis resulting from criminal abortions. In defense of the hospitals, I would like to state that they have no more reason to refuse to receive and treat such cases than they would to refuse admission and treatment to any individual who was shot or badly injured as a result of attempted murder by some other party; nor can they be expected to constitute themselves into a criminal detective bureau for the purpose of running down and fastening the crime upon the guilty party. They are willing, however, to aid the Coroner and State's Attorney to the best of their ability, and the reason that they do not do so is owing solely, I believe, to their ignorance of the forms of

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law necessary in such a procedure. I would suggest that a form of ante-mortem statement be drawn up by our attorney, and that we print and distribute them among all the hospitals, with directions and instructions as to their use. By this means the testimony of the witness, who is really the only competent one in these cases, would be put into such shape that it would be effective and admissible as evidence after death.

Ambulance Service.

And now a word or two concerning our proposed ambulance service. For years past the emergency ambulance service has been in the hands of the police department. While they have given the best service possible with the material in their hands, it has been admittedly woefully incompetent. When a man is injured seriously in some manner, no physician or surgeon being within reach, a call is sent to the nearest police station and in due time an ambulance reaches the scene of the accident. The men on the ambulance, while willing, have not the knowledge necessary to perform what to the skilled surgeon is but a trivial operation. He is put into the ambulance and taken to the nearest (?) hospital. Before he reaches there, loss of blood, or perhaps, the penetration of soft tissues by a splinter of bone, or even the effects of a poison which might have been counteracted by the prompt administration of an antidote, have done their deadly work and the patient reaches the hospital in a dying condition. Had the ambulance been in charge of a skilled physician a life might have been saved. On the other hand a great many minor accidents could be successfully treated by the ambulance surgeon and a long and trying trip to the nearest hospital could be dispensed with and the ambulance be back at its station ready for another run.

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On November 26, 1906, the City Council directed the Chief of Police to turn over to the DEPARTMENT OF HEALTH the police ambulance service and directed the COMMISSIONER OF HEALTH to include the cost of maintenance of the same in his estimate for the next year's appropriation for the DEPARTMENT OF HEALTH. It is proposed by the COMMISSIONER OF HEALTH to put this service under the control of the Bureau of Hospitals and to furnish a physician with each ambulance who shall be in constant attendance upon the ambulance and will go out with it on every run. The whole service being under the direction of the DEPARTMENT OF HEALTH, a great improvement must necessarily result.

In another way the ambulance system being under the administration of the DEPARTMENT OF HEALTH and having a trained physician in attendance will prove of immense economic value to the city. This is in accident cases where the city is sued for damages by people falling on defective sidewalks, and into man-holes, and holes in streets, and the complainant comes into court months or perhaps years later with the long string of disabilities which may or may not have been the result of the accident.

By means of our daily reports from the ambulance surgeons, the City Law Department will be in a position to combat any of these claims and thereby save the municipality many thousands of dollars each year. In fact, the saving in damage suits should nearly approximate the ambulance appropriation.

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MEDICAL CASES REPORTED: 1906.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for year.
Remaining from previous month.	763	898	927	892	966	1001	1059	1103	1123	1200	1119	1133	.....
Admitted during month.	1132	1024	1127	1226	1200	1163	1132	1204	1225	1316	1181	1290	14220
Discharged during month.	861	870	1015	1001	1019	992	959	1023	1003	1061	1020	1090	11914
Died during month.	136	123	147	151	146	113	119	161	145	136	147	169	1698
Remaining at end of month.	898	927	892	966	1001	1059	1103	1123	1200	1119	1133	1164	.....
Percentage of deaths per month.	7.2	6.4	7.2	7.2	6.8	5.3	5.4	7.0	6.2	5.4	6.4	7.0	6.5

SURGICAL CASES REPORTED: 1906.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for year.
Remaining from previous month.	1188	1226	1264	1277	1168	1065	1014	1078	970	962	1065	1107	.....
Admitted during month.	2124	2017	2123	2302	2387	2321	2663	2401	2274	2407	2235	2062	27316
Discharged during month.	1966	1867	2021	2294	2380	2256	2475	2380	2175	2202	2177	2101	26294
Died during month.	120	112	89	117	110	116	124	129	107	102	106	112	1344
Remaining at end of month.	1226	1264	1277	1168	1065	1014	1078	970	962	1065	1107	956	.....
Percentage of deaths per month.	3.6	3.5	2.6	3.3	3.1	3.4	3.4	3.7	3.3	3.0	3.2	3.5	3.3

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Obstetric Cases Reported: 1906.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December	Total for year.
Remaining from previous month.	191	117	168	115	140	170	161	148	176	167	185	188	.....
Admitted during month.	235	209	220	244	290	247	247	257	268	252	256	247	2963
Discharged during month.	214	200	217	210	255	269	254	237	269	230	251	241	2817
Died during month.	5	9	6	9	5	7	6	2	8	4	2	3	66
Remaining at end of month.	117	168	115	140	170	161	168	176	167	185	188	191	.....
Percentage of deaths per month.	1.5	2.8	1.8	2.5	1.2	1.7	1.5	0.5	1.8	1.0	0.5	0 7	1.4

Gynecologic Cases Reported: 1906.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for year.
Remaining from previous month	211	309	306	315	332	322	325	337	300	317	372	348	.....
Admitted during month.	447	423	492	439	402	361	455	296	381	431	364	344	4995
Discharged during month.	343	308	475	408	402	347	432	326	357	368	375	404	4600
Died during month.	6	13	8	14	10	12	11	7	7	8	13	8	117
Remaining at end of month.	309	306	315	332	322	325	337	300	317	372	348	280	.....
Percentage of deaths per month.	0.9	1.8	1.0	1.9	1.3	1.8	1.4	1.1	1.0	1.1	1 8	1.2	1.3

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TOTAL CASES OF ALL KINDS: 1906.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for year.
Remaining from previous month.	2263	2550	2605	2599	2606	2558	2559	2666	2569	2646	2741	2776	.....
Admitted during month.	3938	3664	3972	4211	4339	4092	4197	4168	4148	4406	4036	3943	49414
Discharged during month.	3384	3240	3723	3913	4116	3844	4120	3966	3804	3851	3823	3836	45625
Died during month.	267	257	250	291	271	248	260	299	267	250	268	292	3220
Remaining at end of month.	2550	2605	2599	2606	2558	2559	2666	2569	2646	2741	2776	2591	.....
Percentage of deaths per month.	4.3	4.1	3.8	4.3	3.9	3.7	3.7	4.4	4.0	3.5	4 0	4 3	4.0

AMBULANCE BARN REPORT FOR 1906.

CHARACTER OF SERVICE.	Number of Trips.	Distance Covered. Miles.	Time Consumed. Hours.
Diphtheria	243	3 847	804
Scarlet-fever	447	6 097½	1 288
Smallpox	21	261	52½
Erysipelas	94	1546	328½
Measles	39	698	143½
Whooping Cough	3	38	8
Chickenpox	19	296	63
Mumps	2	48	11
Discharge of patients to cars	7	28	7½
Provisions	7	101	28½
Horseshoe shop	141	845	340½
City Hall	91	1 320	330
Total	1 115	15 120½	3 401½

THOS. J. RODMAN,
Barn Foreman.

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REPORT OF THE BUREAU OF SANITARY INSPECTION, 1906.

PERRY L. HEDRICK. C. E., CHIEF SANITARY INSPECTOR.

DURING the past year this bureau, in addition to what might be termed its regular work, has made some extensive investigations referred to more particularly under the various divisions of this report and under the headings of (1) Workshop Investigation, (2) Tenement House Investigation, (3) Stock Yards Investigation, (4) Candy Factory Investigation, (5) Restaurant Investigation, (6) School Investigation, (7) Police Station Investigation, (8) Factory Investigation. As a result of this investigation some remedial legislation has been proposed which is referred to more at length under its particular division. The results of a part of the previous year's efforts as recently crystallized are specifically set forth in a portion of this report.

Regular Bureau Work.

Building plan approval. During the past year the number of plans approved were 10 851, the number for 1905 being 10 039, the difference being 812 plans in favor of 1906.

It is of interest to know what and how many plumbing appliances have been installed in buildings for which plans have been approved. I therefore submit a tabulated statement of the numbers and kinds of fixtures installed in each class of buildings scheduled. See tabulated statement.

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TABLE OF NUMBER AND KIND OF PLUMBING APPLIANCES INSTALLED IN NEW BUILDINGS, 1906—DATA COLLECTED FROM PLANS SUBMITTED.

	FLATS.								FACTORIES AND OFFICES.								RESIDENCES.								Grand Totals.
	Water Closets.	Urinals.	Lavatories.	Bath Tubs.	Sinks.	Laundry Tubs.	Other Fixtures.	Totals.	Water Closets.	Urinals.	Lavatories.	Bath Tubs.	Sinks.	Laundry Tubs	Other Fixtures.	Totals.	Water Closets.	Urinals.	Lavatories.	Bath Tubs.	Sinks.	Laundry Tubs.	Other Fixtures.	Totals.	
January	916	103	602	554	610	145	48	2 978	152	26	116	21	70	5	4	394	188	....	156	152	186	55	1	738	4 110
February	999	39	753	732	803	185	12	3 523	152	41	200	15	69	....	....	486	237	....	204	198	242	46	1	928	4 932
March	1 121	100	877	856	998	225	20	4 297	247	51	142	16	121	2	11	590	271	....	224	210	273	80	1	1 059	5 946
April	1 775	34	1 435	1 452	1 292	301	6	6 295	596	182	436	40	203	19	71	1 546	392	....	327	320	486	138	1	1 604	9 445
May	1 724	59	1 281	1 297	1 453	397	18	6 179	295	48	218	12	111	....	16	700	379	7	324	311	392	120	3	1 536	8 415
June	1 898	68	1 504	1 354	558	365	6	5 753	323	75	261	7	126	4	18	814	318	....	242	206	358	89	1	1 274	7 841
July	1 297	90	937	915	1 120	229	21	4 609	229	54	163	9	97	2	44	598	346	....	286	274	356	94	1	1 367	6 574
August	1 165	114	783	772	936	187	31	3 988	388	94	319	76	123	1	17	1 018	388	5	305	305	424	85	....	1 512	6 518
September	1 111	43	824	836	981	221	....	4 016	322	36	211	13	139	....	24	752	390	....	317	308	417	128	1	1 561	6 329
October	1 281	20	1 064	1 040	1 116	296	6	4 823	205	33	69	5	80	....	14	406	343	....	302	291	401	89	2	1 428	6 657
November	1 307	33	1 074	1 062	1 069	289	4	4 838	754	95	179	1	128	....	11	1 168	264	....	230	219	278	100	1	1 087	7 093
December	746	6	642	628	666	182	11	2 881	250	51	149	4	68	....	7	529	188	....	170	149	194	80	1	802	4 212
Totals	15 440	709	11 756	11 498	11 602	2 992	183	54 180	3 920	786	2 472	219	1 334	33	237	9 001	3 704	12	3 087	3 018	3 942	1 114	14	14 891	78 072

TOTALS OF FIXTURES.

Water Closets	23 064
Urinals	1 507
Lavatories	17 315
Bath Tubs	14 735
Sinks	16 878
Laundry Tubs	4 139
Other Fixtures	434
Totals	78 072

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A detailed statement of the number of building plans submitted for approval appears in the following table:

NUMBER AND CLASS OF PLANS APPROVED BY THE DEPARTMENT OF HEALTH FROM JANUARY 1 TO DECEMBER 31, 1908.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Residences with one family each	195	344	307	460	383	364	348	398	405	364	234	198	4005
Tenements or Flats and Apartment Buildings	160	338	286	415	395	420	345	295	345	272	278	213	3762
Total for strictly residence purposes	355	682	593	875	778	784	693	693	750	636	512	406	7767
Stores, Storage and Warehouse Plans	47	91	55	58	50	57	72	54	52	50	41	56	683
Factories and Shops	14	50	32	30	21	17	21	17	28	34	30	23	325
Stables and Barns	10	15	26	28	30	44	31	32	30	40	25	26	337
Store Plan, Flat above	60	123	102	124	106	196	100	121	91	96	93	64	1285
Store Plan, Flat in rear	31	45	58	39	40	47	32	30	39	47	36	20	453
Total No. of Building Plans submitted and approved	526	1006	766	1154	1035	1145	949	956	1090	883	746	595	10 851
No. of Families in Residences	195	344	307	460	383	364	348	398	405	364	234	198	3805
No. of Families in Tenements, Flats or Apartment Buildings	504	1009	809	1178	1296	1251	927	726	913	1007	880	640	11 905
Total No. of Families provided for	704	1177	1029	1526	1412	1494	1059	896	1043	1120	1009	724	12 948

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Building Plans.

The expenses of the office, even though they were increased this year over former years, will be more than half met by the fees accruing from building plan approval and from the licensing of workshops. The office experienced some difficulty early in the year in securing exact data from those who submitted building plans for approval as to the number of plumbing fixtures installed, the number of fixtures not shown upon plans or withheld being a direct gain to the submitter of the plan. To obviate this difficulty, Section 1728 of the Revised Code of 1905 was amended June 18, 1906, to read as follows:

> "1728. FEE BEFORE PLANS ARE APPROVED.] Before plans are approved the following fees for inspection shall be paid to the City Collector:
>
> "When the building contains from one to six plumbing fixtures, the sum of fifty cents shall be paid for the inspection of each fixture, and for each and every additional fixture thereafter installed, or for which waste or vent fittings are installed, the sum of twenty-five cents shall be the fee for inspection."

This amendment was a very proper one for the reason that unless fees were collected for fittings installed, fixtures might afterwards be added. The party in charge of the building would subsequently after the building was passed upon final inspection have other plumbing appliances then added.

The fees collected from building plan approval.....	$32 264
The fees collected from workshop licenses.	2 452
Total.....	$34 716

Workshop Investigation.

In pursuance of the regulations and requirements of the city ordinances, we have made inspections covering the places of employment where articles of wearing apparel are made for sale, such places being commonly known as "workshops."

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The following is a list of the articles of wearing apparel licensed under the workshop provisions of the city ordinances :

Aprons.
Artificial flowers.
Belts.
Buttonholes.
Bustles.
Bust forms.
Corsets.
Cloaks.
Coats.
Collars and cuffs.
Cutting of clothing.
Altering and repairing of clothing.
Dresses.
Elastics.
Feathers.
Furs.
Gloves.
Knitted goods.
Sweaters.
Canvas linings.
Infants' shoes.
Curling feathers.
Tea gowns.
Kimonos.
Masquerade and stage costumes.
Hats and caps.
Hat frames.
Braided dresses.
Infants' wear.
Neckwear.
Night and bath robes.
Overalls.
Suits.
Pants.
Raincoats.
Shirts.
Skirts.
Underwear.
Vests.
Waists.
Waiters' goods.
Wrappers.
Uniforms.
Petticoats.
Sacques.
Men and women's clothing.
White duck clothing.
Millinery.
Samples of clothing.
Suspenders.
Trimmings and buttons.

The accompanying map of the City of Chicago shows over what portions of the city this list of articles is made; that is, in what sections workshops abound. A casual study of the map reveals the fact that many of these workshops are located in congested districts. The outlying shops are as a rule the better lighted and ventilated ones. Those upon the southwest side with the exception of those in the Ninth and Nineteenth wards, are probably kept in the most sanitary condition. Racial habits and custom mark the character of the different shops.

The investigation into workshop conditions during the past year has been the most thorough I believe that has

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ever been made in the City of Chicago. I have given a great deal of personal attention to this work, both in directing the scope and character of inspections to be made and in the making of personal investigations. The inspections of workshops in previous years have been made in a more or less perfunctory manner. I have been much surprised myself in finding that even the inspectors did not have the knowledge of the proper standards of sanitary requirements that should be demanded of all such places. While there are doubtless some workshops in the city today which are not in as good sanitary condition as they should be, there is no doubt in my mind but what clothing is being manufactured under reasonably clean conditions in all of them and under perfect conditions in many. This is a case requiring a great deal of persistent effort directed mainly along the line touching those in charge of workshops as to what conditions must be maintained if they are to be permitted to continue to operate their shops. It has been necessary in many cases to threaten the withdrawal or revocation of the licenses in case the requirements as prescribed were not made.

There are two conditions generally existing in workshops to which it is desired to call particular attention. One is the giving out of work to be finished in the home, and the other is the lack of ventilation in the workshop. Remedial legislation covering both these points as suggested will be found under the head of "Remedial Legislation". Section 1258 of the Revised Code of 1905 provides that "No one of the articles mentioned in this Section shall be made, finished, altered or repaired in any room or apartment used as a living room or a sleeping room; nor shall any workshop be conducted, maintained, operated, or carried on in any cellar or basement." This provision of the section has for its purpose the prohibiting of the making or finishing of articles of wearing apparel in the home. However, as the penalty in the

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article on workshops could only be imposed upon the parties who take the work to their homes to be finished, the enforcement of the same would only add hardship to existing privations.

The following list of articles of wearing apparel given subsequently under "Sweated Articles" are being carried to the homes to be finished where members of the family at times are found to be ill with diphtheria, scarlet fever, smallpox, measles, or consumption. Articles of wearing apparel were found to be carried to homes where the sanitary conditions were very bad. The goods so taken were invariably handled in a careless manner, being either placed upon the beds or upon the floor, and in no place have these home finished goods been completed in rooms set apart for that purpose but are jointly used for either eating or sleeping purposes. The attendant dangers to the general public are very great. Disease is most likely to be spread by the continuation of such practices especially where the diseases of diphtheria, scarlet fever, smallpox, measles or consumption exist. That the same supervision should be given to the making of clothing in all its parts as is given to that by municipal authorities in licensed workshops, is beyond question. Therefore, the remedial legislation proposed should be enacted.

There is much of this work of finishing of articles of wearing apparel or of the making of them in part, in rooms of the home used for eating or sleeping purposes, and in the main under unfavorable conditions. This may be properly termed "sweatshop work." The presence and prevalence of thousands of such cases of unsupervised home work where the workers are producing in whole or in part everyday commodities, makes this system of industry a constant menace to the health of the public who purchase the goods.

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A clear idea of what work is done in the home can be obtained from an examination of the following list of articles:

Sweated Articles.

Boys' pants, women's cloaks, aprons, artificial flowers, finishing men's trousers, boys' coats, dresses and skirts, furs, overalls, wrappers, sweaters, buttonhole making, and finishing of vests.

In no instance has the wholesaler or contracting dealer been found to be at all interested in the conditions under which the articles of wearing apparel were manufactured in the home, the only thought being how *cheap* it can be done. Some of the highest grade clothing has been found to be finished under questionable conditions. Articles, except for the cutting, have been made entirely in the home by underpaid labor, made under very poor sanitary conditions and sold under the trade mark of the best known firms in the city. It suggests a question, "What's in a name?"

The amount of home finishing done in this city is large, so large that the only way that it can be regulated or stopped is by methods set forth under the amendments proposed. It is not an uncommon sight to enter any portion of the workshop district and see dozens of people, more particularly women and children, carrying articles of clothing to their respective homes to finish their allotted tasks.

While the question of labor and remuneration for the same does not in any large sense belong here, it is worthy of note in passing to cite that the family's weekly wage exclusive of the husband's or father's earnings rarely exceeds $2.00. According to data which have been secured from those actually engaged in the making of clothing, it can be concluded that the price paid for the manufacture of such articles is not what forces the work to be done in the home under such unfavorable conditions and at such a low

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wage. The weekly wage of the contractor operating average shops is from $200.00 to $400.00 per week. This is based upon statements secured from those engaged in the clothing business.

An examination of the table of workshop data submitted in this report will reveal a number of interesting facts. The table sets forth the number and character of shops licensed, number of employes actually engaged, number of employes permitted under the city ordinanes according to the cubical capacity of the workshops, and a comparison of the figures given in the table with reference to the number of persons actually employed and those which might be employed. It indicates clearly that the workshops as a whole are not overcrowded. This table also gives a tabulation of the number of notices served upon each particular shop and the number which were served upon the tenant or occupant, the number served upon the owner, and the number of suits brought to enforce compliance with the city ordinances.

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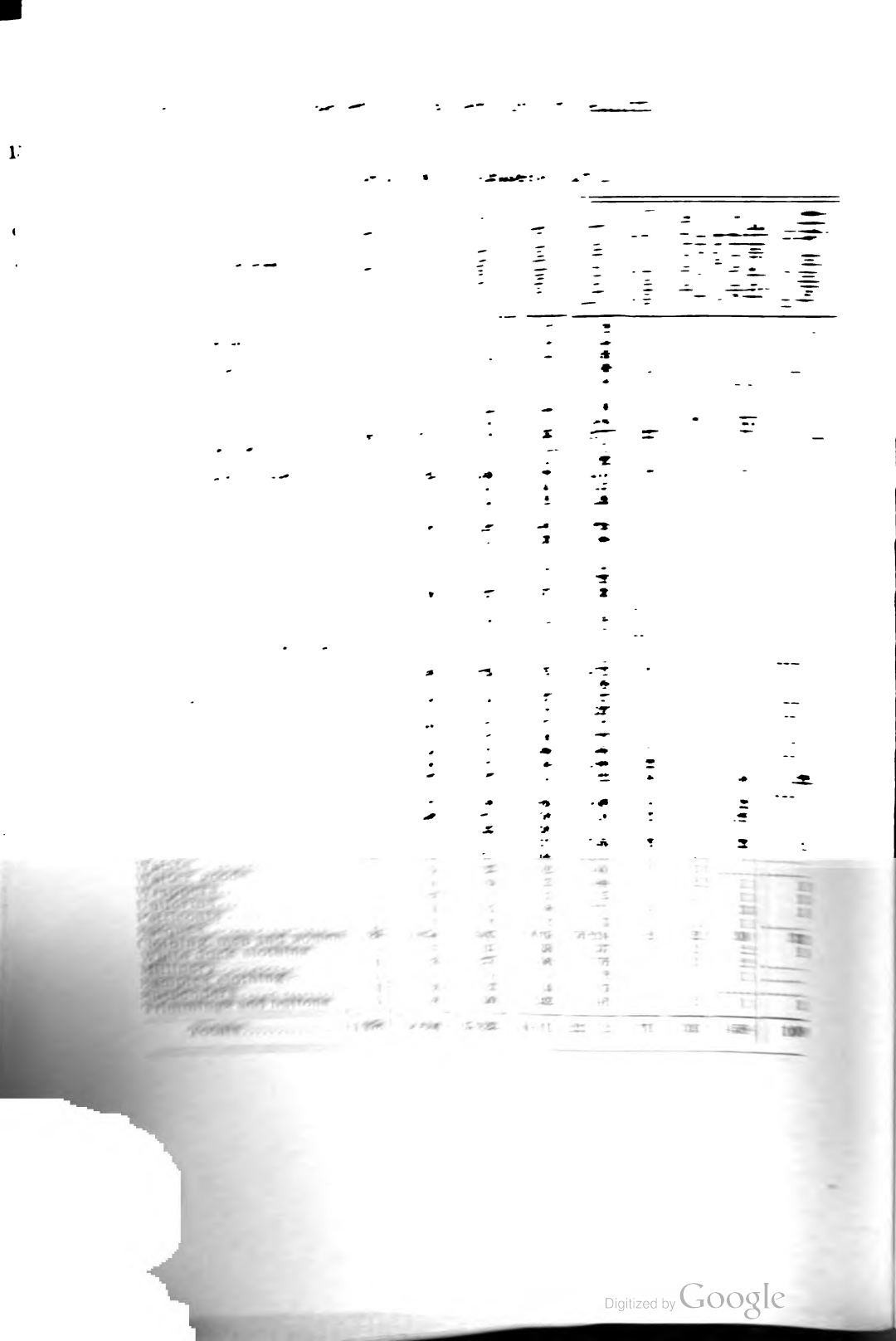

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HANCES FOR THE INFECTION OF CLOTHING MADE IN HOMES.

CHILD RECOVERING FROM A CONTAGIOUS DISEASE PLAYING AMONG GARMENTS.

CLOTHING THROWN ON FLOOR WITH CAT ASLEEP THEREON.

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CHANCES FOR THE INFECTION OF CLOTHING MADE IN HOMES.
GARMENTS STACKED ON CHILD'S CRIB AND COUCH.

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A second table is given setting forth the character of the violations and also giving the number of such violations found :

Table Showing Character and Number of Violations in Workshops.

	Character of violations.	No. of violations.
1.	Defective plumbing, pipes and fixtures	51
2.	Insanitary premises	327
3.	Labels lacking on toilet room doors	345
4.	Walls needing whitewash	206
5.	Overcrowded conditions	44
6.	Toilet rooms not properly ventilated	461
7.	Washing facilities lacking	3
8.	Rest rooms provided*	52
9.	Separate toilets not provided for men and for women	14
10.	Insufficient No. of water closets	64
11.	Insufficient water supply for plumbing fixtures	93
12.	Miscellaneous	299
13.	Privy vaults on premises	16
		1923

Illustrated Findings.

A number of views are given which indicate more clearly than words can express the conditions under which home work is done. These show that little regard is had for the careful handling of clothing as to cleanliness or place. Invariably it is piled and kicked about upon the floor, used in play by the children, or temporarily placed upon the beds to be used as bed covering as occasion may demand. Many people of varying degrees of health have been found in a small room where work of this nature was carried on. During the investigation of workshops the rule was found to be that clothing was being scattered over the floors, was being trampled upon and kicked about, and handled in a very insanitary manner. These conditions have been largely remedied, and recent investigations show that the demand for the careful handling of clothes and the furnishing of

*Rest rooms are not required by ordinance. However, the DEPARTMENT encourages the same under the moral suasions of a written request.

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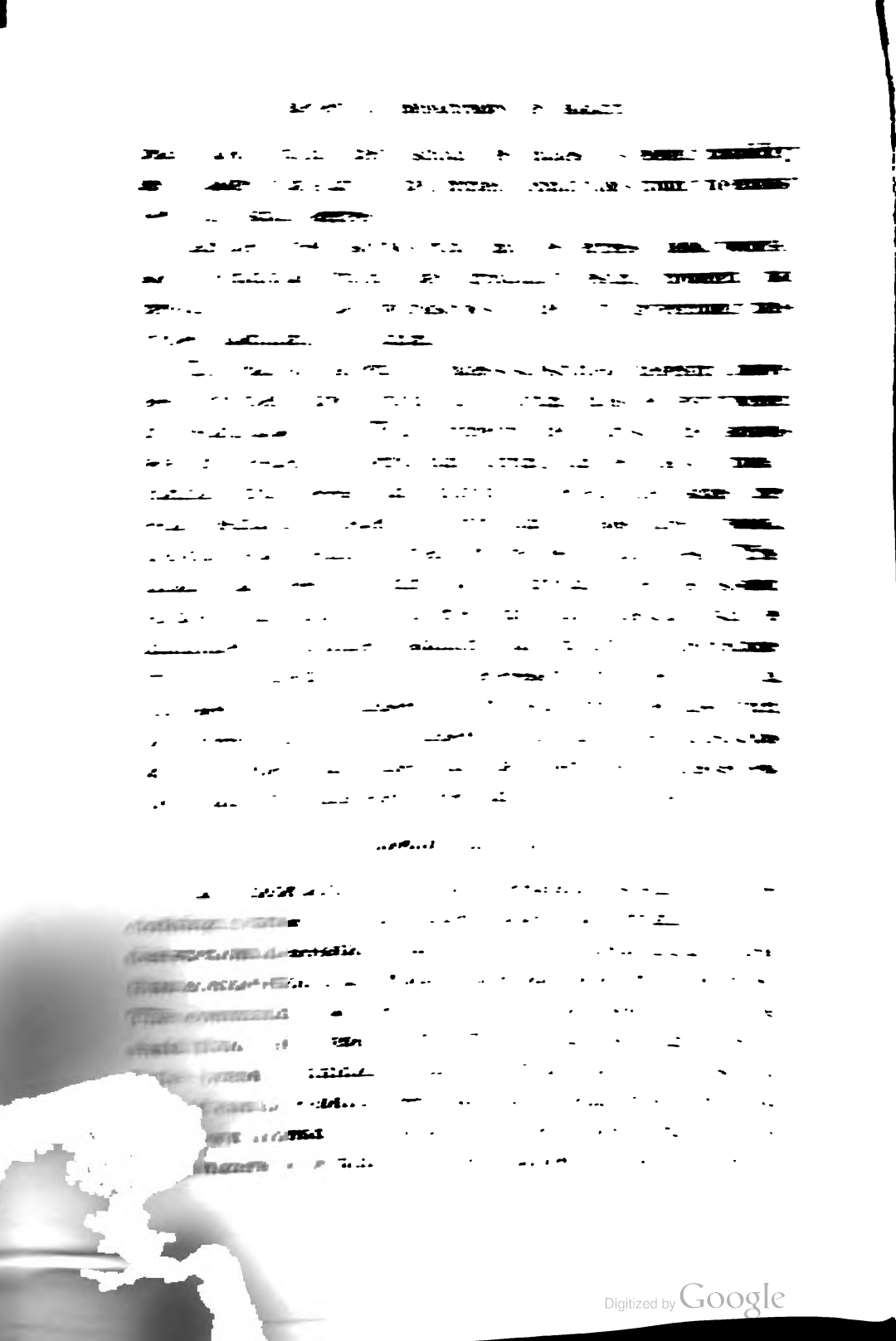

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IDEAL CONDITIONS FOR HANDLING CLOTHING—RACKS PROVIDED FOR EACH OPERATOR.

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greed of others. There is no valid reason that can be raised against the making of any article of wearing apparel in its entirety in the shops, or licensed work place, on account of any occasioned increase and prohibitive cost of manufacture. Owing to the change as above set forth the remuneration in this line of work at present to the contracting tailor is quite large as compared with that of other vocations. At any rate should the cost of production to the public be slightly increased in order that large profits to the contractor may be assured, the public is willing to pay the price of production. To correct this evil, and to bring about still better conditions in the workshop and in the work places the following amendments to the city code have been drafted and recommended for introduction into the City Council for enactment into law in the very near future.

Amendments to Revised Code of 1905.

Amend Section 1258 of Chapter XXIV of the Revised Code of 1905, as follows:

> SECTION 1258. WORKSHOP DEFINED]. Any place where goods or products are manufactured or repaired, cleaned or assorted, in whole or in part, for sale or for wages, shall be taken to be and held to be a workshop, and whenever any house, room, or place is used for the purpose of carrying on any process of making, altering, repairing, finishing, or the sewing on of any tags or labels on clothing, for sale or for wages, any coats, vests, trousers, knee pants, underwear, overalls, cloaks, shirts, women's waists, purses, feathers, artificial flowers, cigarettes or cigars, or any article of wearing apparel of any kind whatsoever, intended for sale, it shall be deemed a workshop for the purposes of this article.
>
> No article of wearing apparel intended for sale shall be manufactured, finished, altered or repaired in any room or part of any tenement house or dwelling where such room or part is used during any portion of the day or night as a kitchen, or used for eating or sleeping purposes. Nothing, however, shall be construed in this Section to prevent the maintenance of a workshop, or the same being conducted in

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a room of a tenement or dwelling set apart to be used exclusively for that purpose, provided that the same is duly licensed according to the provisions of this Chapter. All articles of wearing apparel which are manufactured (but the manufacture of the same is in no wise authorized), altered, repaired or finished in any room used as a kitchen or for eating or sleeping purposes shall be known as "Tenement Made," and it shall be the duty of the Commissioner of Health, to mark or cause to be marked, branded or stamped indelibly, conspicuously and securely upon any such article or any parts of the same so made, altered or finished, the words, "Tenement Made," in small pica capital letters. These words shall be marked, branded or stamped upon such articles in at least three separate places or positions. It shall be unlawful for any person to deface, cover, alter, remove, or obliterate such a mark, brand or stamp after it has been once affixed under penalty of not less than five dollars fine, nor more than fifty dollars fine for each stamp, mark or brand so altered or destroyed.

Every person, firm or corporation contracting for the manufacturing, cleaning, assorting, altering, repairing, or finishing of any of the articles mentioned in this Section, or interested in the giving out of material from which they or any part of them are to be manufactured, altered, repaired, or finished, shall keep a register of the names and addresses plainly written therein in English, of the persons, firms or corporations to whom such articles or materials are given to be manufactured, altered, repaired or finished, or with whom they have contracted to do the same. It shall be the duty of such persons before giving out the same to ascertain from the Commissioner of Health whether the workshop or whether that portion of a tenement house or dwelling which is set apart or to be set apart for such use is licensed as provided for in this Article.

It shall be unlawful for any person, firm or corporation to give out any material to be manufactured, cleaned, assorted, altered, repaired or finished to any person, firm or corporation without knowing or having ascertained that said person, firm or corporation has secured a license for the place at which such material is to be manufactured, cleaned, assorted, altered, repaired or finished as provided for in this Article.

Every such list or register as hereinbefore referred to shall be produced for inspection on demand by the Commissioner of Health, or upon the demand made by any inspector as referred to under Section 1040 of the Revised Code of 1905. It shall be the duty of every person, firm or

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corporation before giving out such material as was hereinbefore mentioned, to notify the Commissioner of Health in writing giving the name of each such person who proposes to do or have done the work of manufacturing, altering, repairing, or finishing of any such material, and to also notify him in writing of the location by street and number where such material is to be so manufactured, altered, repaired or finished.

It shall be the duty of every person, firm or corporation who has been licensed to operate a workshop in case of removal from the place for which a license was secured to notify the Commissioner of Health in writing immediately of such removal, and to further state in such notification the location of the premises by street and number to which he removes his workshop or in which new place he conducts a workshop if he continues in business.

Any person or persons, firm or corporation who violates any of the above provisions shall be fined not less than twenty-five dollars nor more than two hundred dollars for each offense.

Every day on which any workshop shall be maintained, kept, carried on or operated without a license, shall be construed as a separate and distinct offense.

SECTION 1258*a*. VENTILATION.] Every building hereafter erected which is designed for or to be used as a store, office building, factory, hall, or place for public assembly, or amusement, workshop, or other structure, or place of employment, except such buildings, or parts of buildings as may be used for storage or like purposes, and except those in which a positive mechanical ventilating plant or system is to be installed providing for and supplying at least two thousand cubic feet of clean, fresh air per hour from which all foreign matter, dust, inpurities, etc., have been removed for each five hundred cubic feet of cubical contents of such buildings or parts of buildings as are used for human occupancy, shall have built into a wall or walls of the same or otherwise provided permanent, vertical ventilating ducts of a total uniform cross sectional area providing for an opening having at least two-thirds of one square inch of wall register opening and ventilating flue or duct area for each square foot of floor area of such store, factory, office building, hall, or place for public assembly or amusement, workshop, structure or other place of employment. Where the same ventilating flue or duct is used for one or more floors, rooms, or apartments adjoining or placed vertically with reference to each other, such ventilating flue or duct shall be increased in area proportionately to the amount of floor area added in

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such adjoining or other floors, the rooms of which are to be ventilated through the provided ventilating flues or ducts. All such ventilating flues or ducts shall be carried through and open above the roof. The tops of all ventilating flues or ducts are to be provided with ventilating cowls to prevent the admission of rain or snow and the same shall be so arranged as to also prevent down drafts and so as not to reduce the area of the vent flues or ducts. The opening from the inside wall surface into the ventilating flues or ducts hereinbefore referred to shall be placed between eight and eleven feet from the floor line of each room and the same shall be so distributed as to ventilate proportionately and evenly each room and all portions of the same on any floor or floors previously referred to. The auxiliary air passage from the wall register opening or openings from the inside face of the wall to the ventilating flue or duct shall be of a cross sectional area equal to the wall register opening and the same shall be continuous without restrictions. The area of each main ventilating flue or duct shall equal the total area of the auxiliary flues or ducts leading from the wall register opening to each of the main ventilating flues or ducts. It is further provided that an area equal to one-third of one square inch of wall register opening for each square foot of floor area shall be a permanent unobstructed opening. It is provided that one-half of the area of the specified wall register opening or openings, but not more than one-half of each register opening may be fitted or provided with a movable damper which shall be arranged so as to be easily operated from the inside of the room.

In all buildings not mechanically ventilated there shall be provided openings in the exterior wall surface or in windows or skylights or otherwise, to provide for the admission of at least two thousand cubic feet of fresh air per person per hour for each occupant of the building.

In all existing buildings used for the purposes hereinbefore set forth, and in all those existing buildings which are not now so used but which may be in whole or part hereafter converted to such use, there shall be provided ventilating ducts or mechanical ventilating systems as above specified and set forth or there shall be placed and fixed in exterior windows such ventilating device having openings for the admission and distribution of fresh air and for ventilating purposes in proportion to the above described areas and for the hereinbefore mentioned purposes. The ventilating arrangements hereinbefore described shall be kept and maintained so as to accomplish at all times the purposes of their installation.

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Nothing in this Article shall be taken to be a waiver of the Health Commissioner's powers or rights to cause the abatement of foul, offensive, or vitiated condition of the air or atmosphere in any building hereinbefore mentioned in such manner as he shall direct.

Any person, or persons, firm or corporation, being the owner, proprietor, manager, lessor, and any person or persons, firm or corporation being in charge, possession, or control, of any store, factory, office building, hall, or place of public assembly or amusement, workshop, or other structure, or place of employment, who shall violate any of the provisions hereinbefore set forth, shall be fined not less than twenty-five dollars, nor more than two hundred dollars for each offense.

Amend Section 1261 to read:

No person or persons, firm or corporation, shall carry on, keep, maintain or operate any such workshop without having first been licensed so to do by the city. Every person, firm or corporation carrying on, keeping, maintaining or operating any such workshop shall annually, on the first day of May of each year, pay a license fee of two dollars per year for each such workshop so maintained by him or them, which license shall be issued and be good for a period ending with the first day of May following the issuance and delivery thereof.

Amend Section 1264 to read as follows:

If at any time after the granting of any such license the Commissioner of Health shall certify to the Mayor that the health of the city, or of the persons employed in any such workshop, is endangered by the maintenance of such workshop, or shall certify that any such workshop is kept in an unclean or insanitary condition, it shall be the duty of the Mayor to revoke the license thereof.

Tenement House Investigation.

Closely allied with the workshop investigation was the house-to-house canvass of tenement houses in a portion of the same districts. Investigations of these tenement districts have revealed the conditions such as the details given herewith set forth. Nothing can more clearly tell the story of the actual home surroundings of a large population of our city than can the data submitted. The special features of

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these congested districts are the crowding together of a large number of occupants to each building, and, second, the dismal and gloomy conditions existing in many of the interiors of the same due to the keeping out of the free air and sunshine which are so much desired for their disinfecting, cheering and life-giving properties.

The remedial legislation now pending before the subcommittee of the Committee on Buildings, and referred to subsequently, will indicate more clearly than has yet been stated what changes should be made to bring such rooms as have been referred to into satisfactory conditions.

Housing Conditions.

While this Bureau has not had a sufficient force of inspectors to canvass any large area of the city where the housing conditions are questioned, and while the pressure of other work has not permitted of the assignments of even a small number of inspectors for regular and consecutive house-to-house inspection over any long period of time, yet we have made limited investigations over a large area and have covered some small areas by consecutive building inspections The accompanying map of the City of Chicago shows in its shaded portions those sections where housing conditions should be investigated; the lighter etchings, two in number, show mainly overcrowded areas — the one in South Chicago, the other back of the Union Stock Yards. The portion most heavily shaded includes overcrowded conditions, insanitary and low basement dwellings, tenements having in part little or no means for the admission of diffused sunlight and buildings with defective drainage and plumbing appliances. People are living in flats where rooms are so dark that articles of furniture cannot be seen in the room. One block of houses in the Nineteenth Ward was canvassed to ascertain just what conditions existed there.

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In the Ninth Ward the blocks shown as shaded in the accompanying portion of the ward map were upon investigation found to contain fifty-two (52) cases of defective plumbing, and to contain forty-four (44) dark and improperly lighted and ventilated rooms. In a large area in the Eighteenth and in a portion of the Twentieth Ward the following important features were found:

Plumbing and drainage defects.....	150
Bath rooms without outside ventilation.....	36
Dark and improperly lighted and ventilated rooms.....	482

As to the territory canvassed from house to house, there is given herewith data as to the number of inspections, and as to the character and number of violations, see "Table of Nineteenth Ward Violations." Many of these violations with the exception of those referring to dark rooms have been removed or abated, and the others which are not of long standing are still pending.

Legal Phases of Tenement House Problems.

In order that the DEPARTMENT might clearly know its duties and responsibilities with reference to inadequately lighted and ventilated rooms under the city ordinances, an opinion covering the same was asked of the Corporation Counsel's office, of which the following is a copy of the reply:

OFFICE OF THE CORPORATION COUNSEL.
CHICAGO, April 17, 1906.

MR. PERRY L. HEDRICK,
Chief Sanitary Inspector.

DEAR SIR:—An opinion given by this Department, March 9, 1906, considers at some length the duties respectively of the Building Department and the Health Department, in remedying unsanitary conditions caused by insufficient or inadequate lighting or ventilating rooms used as places of habitation, or occupied for living purposes in apartments or tenement houses, erected and used as such prior to the adoption of the present Municipal Code. There is no intention or desire whatever to modify or depart from the conclusions there expressed.

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It is the duty of the Health Department to determine if unsanitary conditions exist in such buildings by reason of inadequate or insufficient lighting or ventilating, and whatever structural changes or alterations are necessary to relieve such condition, should be *ascertained by the* Building Department, and made under the *direction and supervision of that Department.*

The mere fact that the conditions to be remedied are considered in the building ordinance, does not relieve the Health Department of its duty and responsibility to enforce health regulations to the extent incumbent upon that Department.

In this connection your attention is called to Section 1068 of the Health Ordinance, which it would seem is sufficiently comprehensive to embrace the question submitted:

"SEC. 1068. Every owner, lessee or tenant, or manager of any tenement house, lodging house, boarding house or manufactory, shall cause every part thereof and its appurtenances to be put, and shall thereafter cause the same to be kept, in a clean and wholesome condition. and shall speedily cause every apartment thereof in which any person may sleep, dwell or work, to be adequately lighted and ventilated. * * * * *"

I do not find in the ordinances any provisions that authorize the closing of any room or prohibiting its occupancy until the unsanitary conditions, under consideration, have been remedied.

It would seem that enforcement of the penalty provided is the only proper course to pursue.

Respectfully submitted.

(Signed) W. W. DEARMOND,
Assistant Corporation Counsel.

Approved: MACLAY HOYNE.
Acting Corporation Counsel.

Subsequent to this opinion and in accordance with my instructions the matter has rested in the absence of specific complaints. A reference to a notable case will show what the DEPARTMENT is endeavoring to do for some of the tenement dwellers:

Upon two parcels of ground, comprising two unsubdivided blocks, irregular in shape and lying north of the Chicago & North-Western Ry. Co.'s right of way and fronting upon North May street and North Carpenter street,

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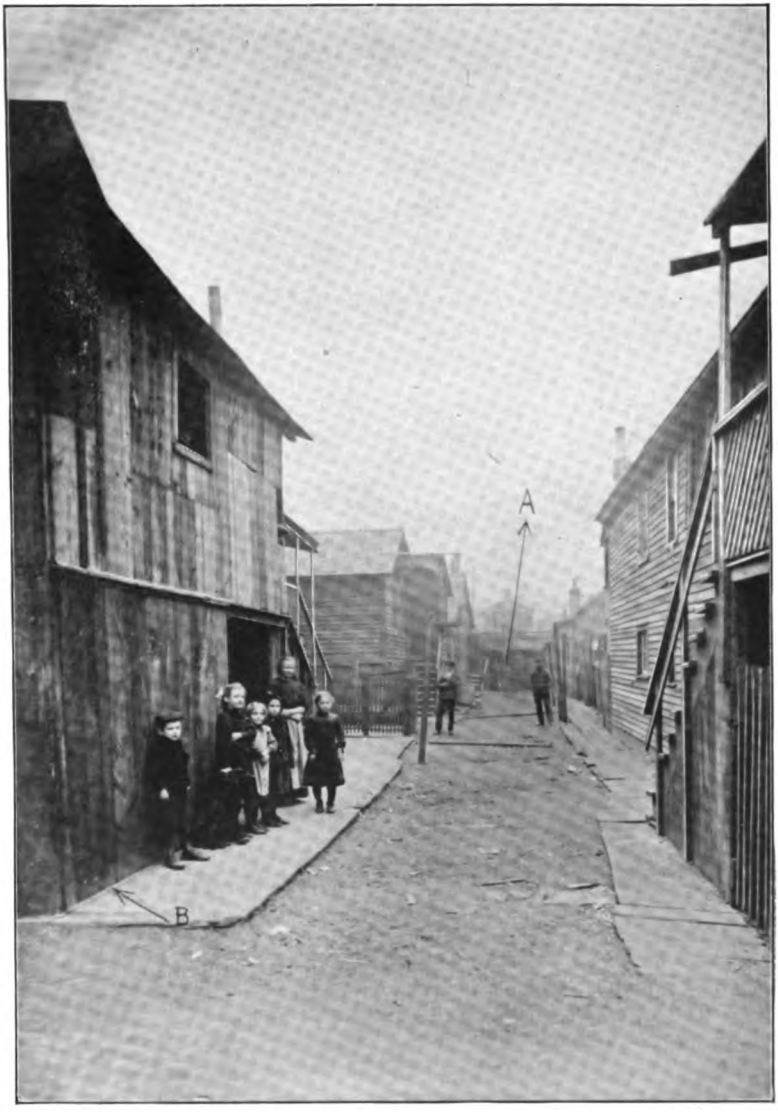

A:—City Water Hydrant at End of Alley.
B:—Location of Cesspool Under House.

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are found thirty-five (35) tenement houses. As many as three of these are found upon one piece of ground of ordinary lot size.

A better idea of the congested condition of this neighborhood with its two hundred and fifty (250) or more inhabitants, of which one-half of this number are small children, can be obtained from the reproduced photograph of the district.

The illustration given is taken looking south from a point about midway of the block west of North Carpenter street, looking down a narrow stub and private alley to the railway company's tracks, showing at the furthest end the city water hydrant house, "A," which is the only source of the city water supply for the houses shown fronting upon the alley.

The houses are owned by the occupant or occupants of the same.

It is not an uncommon occurrence that two families live in a six-room house and each owns one-half of the house, while the fee to all of the ground rests in a second party, to whom a ground rental of twenty dollars per year is paid.

The sanitary arrangements for these homes are the most primitive, and on account of the crowding of the buildings together these arrangements are in the main located beneath and within the buildings.

The lower part of these buildings, which are supported
n posts, are used for various purposes. There is to be
nd here one room used as a kitchen and dining room,
emaining space equal to and adjoining this is used
ıge shed, in which is located the cesspool. The
the cesspool in many of these houses is in the
dicated by the arrow "B" (beneath the nearest
he house shown at the left of the narrow alley).

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The Bureau's initiative was directed against this pestilential spot during September, 1905. On account of the owner of the premises failing to comply with the notice to abolish all cesspools and to provide proper plumbing appliances and water connections the first suit was brought September 27, 1905. (No compliance.) The second suit was brought October 31, 1905. (No compliance.) The third suit was brought May 2, 1906. (No compliance.) The fourth suit was brought May 17, 1906. (No compliance.) The fifth suit was brought August 14, 1906. (No compliance.) The sixth suit was brought September 5, 1906. (No compliance.) The seventh suit was brought December 21, 1906, in the Municipal Court with the hope that compliance may now be had. The case has not yet been called.

The fight for a cleaner section here has been long and desperate. The last case disposed of in the Justice Court was entered there July 13, 1906, and fined $100 and costs on November 30, 1906.

Remedial Legislation.

The building ordinance provides that an alcove room adjoining another room shall have at least twenty (20) per centum of the entire wall surface of alcove opening into another room. This provision applies in new buildings, and in old buildings where there are alterations made, or in existing buildings changed into flat or tenement buildings.

An attempt was made through an amendment of Section 421 of the Revised Municipal Code of 1905, introduced into the City Council October 8, 1906, to reduce this alcove wall opening from twenty (20) per cent to ten (10) per cent. Foreseeing the danger that would result from allowing this to become enacted into law, the Committee on Buildings, to which this proposed amendment was referred, were notified by the Commissioner of Health of this Bureau's objection to

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the same. As a result, when the amendment was brought up for hearing in the committee, after the objections were heard to it, a suggestion was made to the committee to have Section 421 changed to read "Every alcove room shall conform in all respects to the requirements for other rooms, except in altering a one-story dwelling into a two-story tenement, every alcove room shall be deemed a separate room for all purposes, within the meaning of this ordinance, except such an alcove, as, adjoining another room, has at least twenty (20) per centum of the entire wall surface of alcove opening into another room."

While the provision of this amendment is good it does not go far enough, and does not clear up the ambiguity existing in Sections 418 and 419. In order that this might be corrected the following amendments were prepared for the consideration of the Committee on Buildings.

Amend Section 418 of said Code to read as follows:

SECTION 418. No room in any now existing tenement house shall hereafter be constructed, altered, converted or occupied for living purposes unless it contains a window having a superficial area not less than one-twelfth the floor area of the room, which window shall open upon a street or alley or upon a yard or court having a superficial area of not less than twenty-five square feet; "or unless such room adjoins another room in the same apartment, which other room shall have a window opening upon such a street, alley, yard or court, and between which two adjoining rooms there is an alcove opening having at least twenty per centum of the entire wall surface of such room as an alcove opening to said adjoining room."

Amend Section 419 to read as follows:

SECTION 419. No room in any now existing tenement house which has no such window as aforesaid, opening upon a street or alley or upon a yard or court having a superficial area of not less than twenty-five square feet, shall hereafter be constructed, altered, converted or occupied for living purposes unless it contains a floor area of at least sixty square feet and also at least six hundred cubic feet of air space; nor unless every part of the finished ceiling of such room be at least eight feet distant from every part of the

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finished floor thereof: provided that an attic room need be eight feet high in but one-half of its area and such attic room shall not be used for purposes of human habitation other than as a sleeping room. "Every room having no such window as aforesaid and having a floor area of sixty square feet or less shall be provided either with a window to the outside as specified above, or converted into an alcove room having at least twenty per centum of the entire wall surface of such room as an alcove opening to an adjoining room which has a window area as required by this Section."

Amend Section 421 of the Revised Code of 1905 to read as follows:

SECTION 421. "In new buildings every alcove room must conform to all the requirements of other rooms. In every existing tenement house which shall be increased or diminished in size or otherwise altered every alcove room shall be deemed a separate room for all purposes within the meaning of this ordinance, except such an alcove as, adjoining another room, has at least, twenty per centum of the entire wall surface of alcove opening to another room."

These amendments to Sections 418, 419 and 421 are very necessary to make the enforcement of the same practical. As they now stand these sections prohibit the occupancy for living purposes of rooms which are not located upon a proper-sized court, or open into a room by an alcove opening, or by a window area of at least fifteen (15) square feet. The amendments, as will be seen, indicate that these same rooms shall be made into alcove rooms, having at least twenty (20) per cent of the entire wall area made into such alcove opening, and does away with the provision allowing the cutting of a sash window with movable parts into the partition, between this inadequately lighted and ventilated room, to a properly lighted one in the same apartment. These amendments have much to commend them. In the first place, an alcove room provision for new buildings is likely to be one which will be misused after the buildings have been erected and all inspections made. It frequently happens that this

NOTE. The quoted portions are the new provision.

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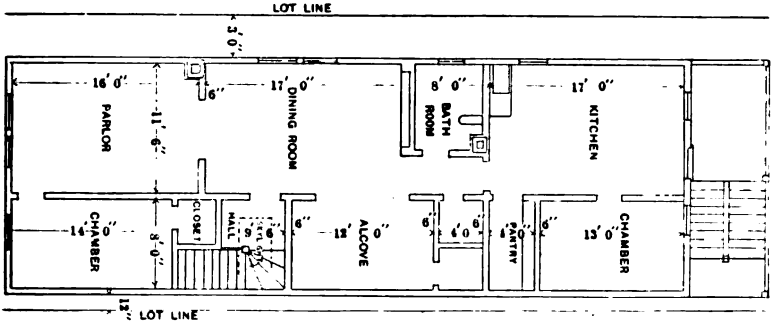
alcove opening is closed up, with the exception of a small door space, leaving the room an air-tight box. Should the amendment, as introduced, allowing for alcove wall opening, be reduced to ten (10) per cent of the entire wall area, this opening would be very little larger than an ordinary-sized room door. The result in probably many cases would be to hang a door in this opening. All light and circulation of air would be barred from this room by such obstruction. It is certainly a wise policy not to allow the use of a window of fifteen (15) square feet placed in the dividing wall between an improperly lighted room and its adjoining outside room, as the only means of lighting or ventilating the same. In existing buildings, where the light has been deficient, such arrangements have been made to little good, the conditions of light being very little better in many of the cases than it was before the change was made, while the alcove provision has, invariably, when followed, brought the second room into a habitable condition.



TENEMENT HOUSE PLAN SHOWING ALCOVE ROOM LIGHTED BY MEANS OF A 20 PER CENT. WALL SURFACE OPENING BETWEEN IT AND THE ADJOINING ROOM.

There is shown in this report a building plan where one of the rooms is an alcove. This building upon this side stands within a foot of the building line. After the completion of the building the owner may close the alcove opening, making this room one with a door as an entrance, hence no light enters the room.

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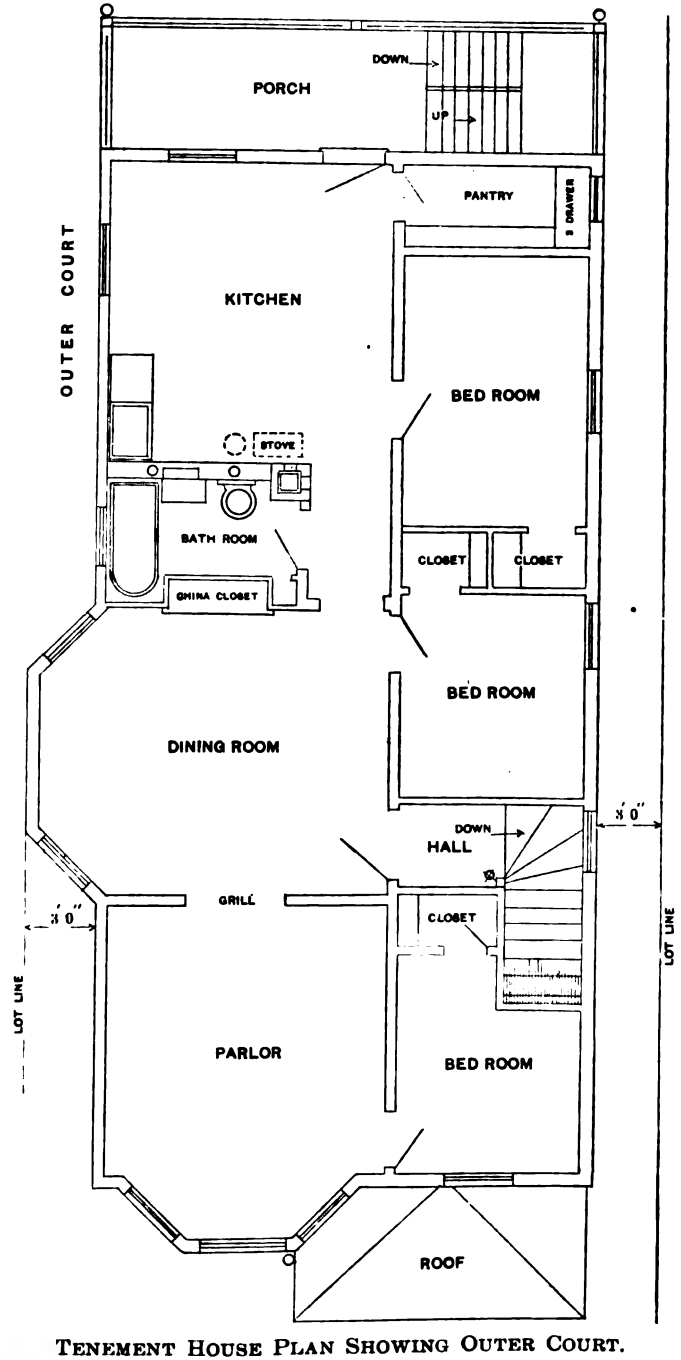

TENEMENT HOUSE PLAN SHOWING OUTER COURT.
ALSO SHOWING THAT ALL ROOMS HAVE OUTSIDE WINDOWS.

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In contrast to this plan is shown one of a flat, or tenement building, where all the rooms are provided with windows directly to the outside air, either to an outer court, or to a street or yard. In this connection, it may be well to note that there is still room for improvement in the building regulations. Lot line courts, when there are two buildings adjoining, become nothing more than inner courts. See plan showing lot line court. The circulation of air in the same is very slow, and not what those who are accustomed to the inhalation of fresh air desire. Although objection is raised to the abolition of the lot line court, owing to its adaptability at times in the designing of buildings, it is not nearly so serviceable as is the outer court, because the light admitted from it is much more diffused, and the circulation of air retarded. A study of the two plans showing each type of court will be of interest, and the force of the argument presented will be appreciated.

In considering the advantages of the outer court, from the plan, the idea can be had of the benefit to be derived from the combination of the horizontal with the vertical rays of light, to say nothing of the greater desirability of such an arrangement owing to the outlook presented.

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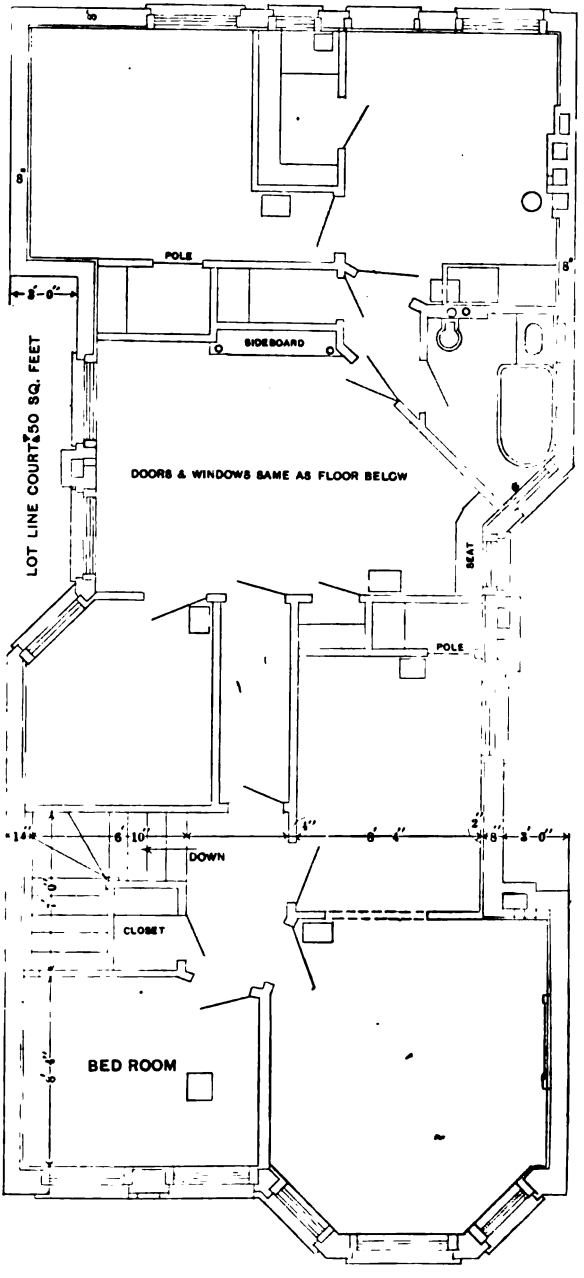

TENEMENT HOUSE PLAN, SHOWING LOT LINE COURTS.

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In the case of the lot line court the only light to be had is from a converging cone of rays of light. The lot line court should be abolished or materially increased in size and provided with an open passage to front or rear for air circulation.

Legislation Affecting Ventilation of Buildings and Parts of Buildings.

The question of using much valuable floor space in our largest office and mercantile buildings, public buildings, club houses and hotels for toilet room purposes, has often been raised. In order that floor areas might be used to the best advantage and in order that a large court area might not necessarily be taken from valuable building space, the following amendments, while not at all sacrificing the benefits to be derived from the placing of toilet rooms upon outside walls and upon open courts, were passed, and buildings constructed in accordance therewith are provided with light and ventilation for toilet rooms as may be desired, and the ventilation on account of continuous changes of air at all times will, under these amendments, be much superior to that gained from windows placed in an exterior court wall.

Be it ordained by the City Council of the City of Chicago:

SECTION 1. That Section 274 of the Revised Municipal Code of Chicago of 1905 (Section 206 of the "Building Ordinance") be and the same is hereby amended to read as follows:

"In all buildings of this class, the fire escape, stairs, stair halls, entrance halls, bay windows, vent shafts, courts, lights in halls, porches, windows in public halls, shall be of the size and dimensions as are prescribed in Sections 392, 400, 402, 404, 412, 415, 416, 417, 418, 419, 420, 421, 422 and 423 of this Chapter relating to buildings of Class VI.

"Where vent shafts as defined in Section 389 of this ordinance, are used to ventilate water closet compartments, bath rooms, or pantries, of hotels, office buildings, or club houses, they shall be of the following dimensions:

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Building.	Square feet.	Least width.
2 stories	22½	3 feet.
3 stories	27	3 feet.
4 stories	36	3 feet.
5 stories	48	5 feet.
6 stories	72	6 feet.
7 stories	96	8 feet.
8 stories	120	8 feet.

"In every hotel, office building, or club house, hereafter erected, and every hotel, office building, or club house, which shall be increased or diminished in size, or otherwise altered after its erection, and in every building, now or hereafter in existence, not now used as a hotel, office building or club house but hereafter constructed or altered to such use, and every habitable room, excepting water closet compartments, bathrooms and pantries, shall have, at least, one window opening directly upon a street, alley, yard, or court. The total area of the windows opening from any such room (other than water closet compartments, bathrooms and pantries), shall be, at least, one-tenth the floor area of that room, and the top of, at least, one window shall be not less than seven feet above the floor, and the upper half of that window shall be made so as to open its full width. No window in any such room (other than pantries, water closet compartments and bathrooms), shall have less than ten square feet of glass area. Every such water closet compartment, bathroom or pantry, shall have a window not less than one foot wide and of an area of, at least, four square feet for a floor area of forty-five square feet or less opening directly into the outer air, or special light or air shafts, into which no other rooms, or compartments, other than toilet compartments, bathrooms, or pantries, are ventilated. For upwards of forty-five square feet of floor area, there shall be a window area of, at least, one-tenth of the floor area. The windows in all cases shall be arranged so as to admit of their being opened, at least, one-half of their height. The urinal, bath or water closet compartments on the top floor of any building may be lighted and ventilated by means of a skylight and ventilator. The area of the skylight shall conform to the above specified areas for windows.

"It is provided that in hotels, office buildings and club houses, the bathroom, water closets and urinal compartments, may be ventilated by exhausting the air from the same at the rate of at least six complete changes of air from each room per hour by approved positive mechanical means through special air ducts to the outer air. The special ventilating duct or ducts, together with their branches, shall be of such

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size or sizes as to provides for the required change of air from each of such rooms.

"It shall be the duty of the owner, agent, architect, or of the party in possession or control of the same, to notify the Commissioner of Health in writing twenty-four hours in advance when any such system is completed, for the supervision of the test.

"When the installation of the mechanical ventilating system for toilet and bathrooms is complete, and the ventilating appliances are being operated at their normal capacities, they shall be tested by the party notifying for test for volumetric efficiency in the presence of, and under the direction of, the Chief Sanitary Inspector of the Department of Health.

"The mechanical ventilating system shall at all times be kept in good repair and in operation to insure the required ventilation during the hours when the above specified buildings are used for human occupancy.

"All such toilet or bathrooms as mentioned in this Section, shall have a fixed window or windows, having a gross glass area and equal to at least one-eighth of the floor area of rooms. The windows are to be provided and placed in the dividing or enclosing partitions, and shall be suitably arranged so as to admit of natural light from an adjoining room which has direct communication to the outside air. All such rooms or compartments shall have proper means for artificially lighting the same, and they shall be properly and adequately lighted by natural or artificial means during the occupancy of the building."

SECTION 2. This ordinance shall be in force and effect from and after its passage.

Restaurants.

In a small way investigations have been started to ascertain the conditions existing in restaurants. From time to time during the year horrible conditions were revealed showing that food was being prepared under highly unfavorable sanitary conditions. Such revelations showed the necessity of a wider investigation as soon as the same could be arranged for. A tabulated statement of the investigations made shows the character of the notices served against these places. It is not an uncommon thing to find open

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catch-basins and open sewers in basements where food is kept and prepared; to find basement floors decayed, waste pipes broken, kitchen sinks defective, tables and benches covered with the accumulations of time, which seem to have been gradually increased since the introduction of the same; to find walls black with dirt, soot and smoke, and the plastering of the same crumbling. In addition to these violations it is not an infrequent occurrence to receive complaints and to find that the kitchens were a source of odor nuisance to the occupants of surrounding buildings. However tempting a cooking odor may be at times, to some it is certainly a most disgusting thing when an unwelcome visitor. The DEPARTMENT has had many cases of this character calling for installation of ventilating stacks fitted up with exhaust fans to carry the odors of the cooking above the roofs of adjoining buildings. A notable case is under discipline at the present time in the loop district where it will be necessary for a number of restaurants to join together in an installation to carry the odor and fumes above the roof of a sixteen- (16) story building which stands twelve stories above the adjoining restaurant buildings which are a grave nuisance to the occupants of the same. Either this installation must be made or the odors must be collected and passed through a water condenser before being allowed to escape into the atmosphere. The first proposition was the more acceptable and is certainly the best in operation as it needs no further supervision from this Bureau, as it is virtually automatic in its operation. Such problems as these are mechanical in their nature and require a good deal of attention from the head of the Bureau.

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The number and character of notices served during the limited investigation is given in the accompanying table:

Number of licensed restaurants inspected	77
Number upon which notices were served	27
Character of notice—	No.
To clean floors	10
To repair floors	5
To limewash walls	11
To ventilate toilets	6
To repair toilets	3
To clean kitchens	8
To ventilate kitchens	7
To provide ice box waste and to clean ice box	9
To provide proper cover for catch-basin	2
To provide proper metal (covered) garbage cans	14
To extend metal conduit to roof	3
To keep kitchen floor clean and free of grease	30
Total violations	108

Bakeries.

Only a small number of bakeries of this city have been inspected during the past year. A statement with reference to the number of twenty-one inspected is given to show the conditions prevailing therein, and in order also to state that the bakeries inspected are a fair average of the remaining bakeries of this city. Of the twenty-one bakeries inspected sixteen were in such condition as to require stringent orders to be given with reference to the placing of the same in sanitary condition. The following conditions were usually found to prevail: The floors, tables and mixing boards were found usually in need of cleaning. No cuspidors were found and no signs against spitting shown. Washing facilities were lacking. The ventilation of toilet rooms was found to be improper; the number of fixtures in the same being frequently found to be insufficient. The inspection of such places is very important and provision should be made for periodical inspection of places given over for such purposes.

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Candy Factories.

The conditions existing in the candy factories were found to be even worse than those recited of bakeries. Here again the inspection force has been too small to allow of inspections to exceed the number of nineteen, against all of which notices were served. In these factories a notable lack of washing facilities was evident. No signs were posted pertaining to cleanliness. Cuspidors were not provided. The dry sweeping of floors prevailed and at times when the factory was working full force, the boxes used for handling raw material were never cleaned. The rest is left to the imagination.

Workplace Investigation.

As is customary in the DEPARTMENT as much attention is given as time permits to inspections of conditions in which employes work. This year a few cases are worthy of note. A number of large manufacturing plants were thoroughly investigated in which conditions throughout are now being rapidly improved. Attention is called to the illustration or plan shown herewith, which is one to provide for the collection of dust from a fibrous operation which at the present time fills the atmosphere of the workroom which is 400x64 feet; the employes were compelled to breathe this dust and fibre as the air was returned to the room without cleansing. This condition is quite serious as upon entering the workplace irritation of the air passages on account of the air impurities, causes one to cough and to feel uncomfortable. The illustration shows the floor plan and an elevation. The floor plan shows where the operator works and the table upon which he places the raw material. This plan was designed by the writer who acted in the capacity of consulting engineer and the installation, according to the plan, is now being made. The air collected and the dust

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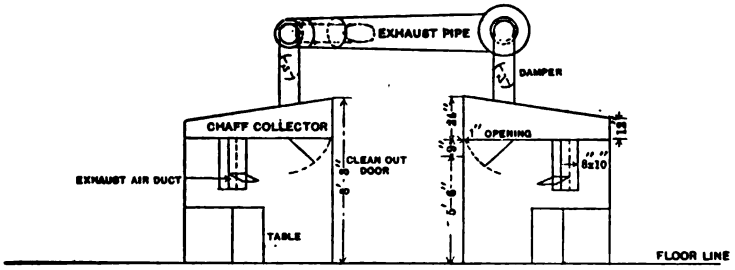

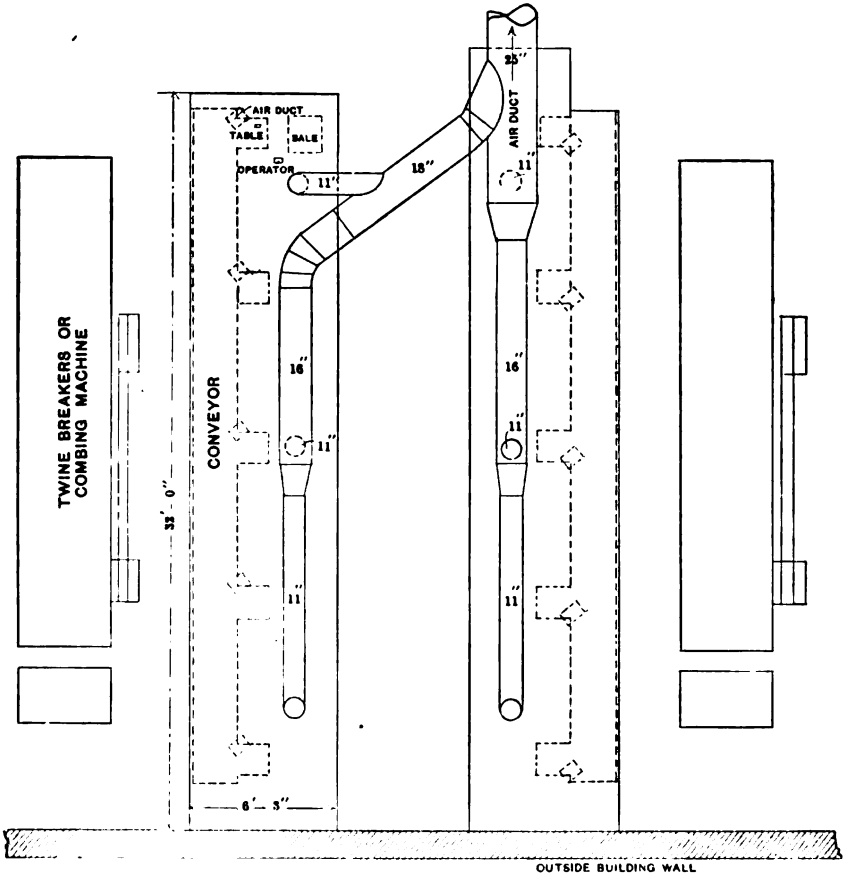

PLAN AND ELEVATION OF INSTALLATION FOR REMOVING DUST AND CHAFF FROM OPERATIVES IN WORK ROOM.

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removed therewith will be disposed of either by discharging the same directly through a dust head to the outside air or through an air wash back into the ventilating system, provision being made, however, for the proper admission of fresh air.

The ventilation existing in some of the large stores of the city was found to be bad, especially in the basements. As the result of suggestions and orders from this DEPARTMENT new ventilating systems have been provided for. This is worthy of mention for the reason that thousands of employees and patrons of the place are affected by the order. The better working conditions for the employes in respect to ventilation is further assured under the amendment to Section 1258, which is the most advanced legislation along this line ever advocated, as well as the most scientific for general adoption in building construction. See amendments under Workshop. In this day and age, when so great a population of the city lives within doors, and where the tendency is on the increase towards consumption, and when the cry is always in such a case for more air, this step for the better sanitation of work places is believed to be in the right direction.

The general betterment of conditions affecting employees in the Union Stock Yards district affects many thousands of persons, and is discussed more at length in another part of this report.

In our workplace investigation attention was called to smoky and gaseous conditions prevailing in many core rooms. The statement is ventured that thanks will be due on the part of employes when our orders pertaining to the same have been fully complied with.

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Theatre Inspection.

Complaints with reference to conditions existing in theatres as to general insanitary conditions and to the lack of ventilation, has caused this Bureau upon investigation to issue sweeping orders against the same. Three of the largest theatres in the city, aggregating a seating capacity of forty-seven hundred persons, were found to be without any positive means to provide fresh air; the result being that the audiences, after the second act, suffered from drowsiness and heaviness in the head. Orders covering the installation of positive mechanical systems providing for a clean air supply according to the best adopted standards for such ventilation, for each occupant of the building and for the proper and separate ventilation of toilet rooms, are under enforcement. In one case the air-shaft bringing the supply of air to the theatre auditorium was found to enter first into the toilet room and from thence into the theatre auditorium, a result accomplished by alteration work made after the theatre was originally constructed.

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Law Suits.

In order to obtain compliance with our notices served against insanitary premises, a total of 1614 suits were instituted during the past year, one premises being designated a suit; the total number of violations, however, being 2245. Among this number of suits, some were of the second and third bringing, on account of the violation remaining after the first or second suit. Where exceptionally bad conditions were found to exist, little courtesy was shown the violator, for a warrant was immediately secured for his arrest, the total number of such cases being twenty-one. The character and number of violations is seen in the table giving the "number and character of violations" for which suit was brought to compel compliance.

TABLE GIVING NUMBER AND CHARACTER OF VIOLATIONS FOR WHICH SUITS WERE BROUGHT TO COMPEL COMPLIANCE WITH BUREAU'S ORDERS.

1.	Dirty premises	166	
2.	Defective drains	129	
3.	Roof gutters and roofs	289	
4.	Apply plumbing tests	58	
5.	Ventilation, drain and plumbing	94	
6.	Provide new water closets	92	
7.	Secure workshop licenses	100	
8.	Equip rendering plant with proper condensers	5	
9.	Abolish vaults	364	
10.	Payment of fees on 759 plumbing fixtures	261	
11.	Warrants	21	
12.	No water supply	29	
13.	Defective plumbing	129	
14.	Water closets, shops, new	6	
15.	Defective water closets	15	
16.	Suspension of plumbers' licenses	2	
17.	Ventilation office building	1	
18.	Ash and garbage receptacles	31	
	New drains	30	
20.	Install self-registering thermometers to rendering plant condensers	11	
21.	Provide windows in tenement house rooms	24	
22.	Defective plastering	1	
23.	Work done by unlicensed plumber	4	
24.	No lights in tenement house halls	3	
25.	Dirty walls and halls	10	
26.	Limewash	27	
27.	Enclose water closets from shops	2	
28.	Offensive odors restaurants and other sources	22	
29.	Manure nuisance	19	
30.	Vaults cleaned without permits	1	
31.	Stagnant water, vacant lots	7	
32.	Install proper traps upon plumbing fixtures	25	
	Carried forward	1933	

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NUMBER AND CHARACTER OF VIOLATIONS—*Continued.*

Brought forward	1 933	57. Smoke house nuisance	1
33. Submit plans of buildings	5	58. Ducks and chicken nuisance	7
34. Rug-beating nuisance	2	59. Decayed wood in basements	3
35. Overcrowded conditions	9	60. Goat nuisance	1
36. Low chimney stacks, smoke nuisance	3	61. Carpet cleaning nuisance upon street	1
37. Dog nuisance	1	62. Provide proper light shafts	1
38. Roosters crowing	4	63. Label toilet rooms	13
39. Remove old wall paper from walls	8	64. Screen toilet rooms	1
40. Horses in basement, etc.	6	65. Provide cement floors	6
41. Stables and barn nuisance	3	66. Clay holes and weed nuisance	16
42. Stagnant water under house	34	67. Ventilate basement	3
43. Pigeon nuisance	4	68. Defective plumbing material used	1
44. Decayed wood-work and rubbish in house	7	69. Insanitary Home for Aged	1
45. Properly connect ice box drain	6	70. Insanitary bedding	1
46. Stock yards odor nuisance	1	71. Hog nuisance	1
47. Clean cesspools	5	72. Provide extra water closets	36
48. Cow nuisance	4	73. Pave court	1
49. Low smokestacks	6	74. Clean catch-basin	13
50. Insanitary restaurants	6	75. Properly ventilate water closet rooms	51
51. Cover and raise catch-basins	8	76. Provide checks for water closet doors	9
52. Gas engine noise nuisance	1	77. Insanitary bakeries	1
53. Steam exhaust pipe nuisance	1	78. Dirty meat market	2
54. Provide back water gates on drains	1	79. Overflowing cesspools	7
55. Provide barn drains	7	80. Blasting noise nuisance	1
56. Rats and vermin nuisance	2		

Total violations	2245
Warrants sworn out	21
Revocation of plumbers' licenses	20
Total number of suits against separate premises	1 614

Complaints.

About the usual number of citizens' complaints were entered during the past year, many being made in good faith. In order that a study might be made of the complaints, a general list of the same is given and a tabulated statement according to wards is submitted.

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SHOWING BY WARDS THE NUMBER AND CHARACTER OF COMPLAINTS ENTERED DURING THE YEAR 1908.

Complaints.	Wards																								
Defective drainage																									
Defective trap																									
Defective soil pipe																									
Defective ventilation																									
Defective water supply																									
Defective water closet																									
Defective yard paving																									
Defective roof gutters																									
Defective and insufficient dustbins																									
Defective water closet, water supply																									
Defective ventilation, sewer gases																									
Overcrowding of dwellings																									
Nuisances in yards																									
Miscellaneous																									
Totals																									
No cause found for action																									
Nuisances abated by notices complied with																									
Complaints not cared for																									
Totals																									

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TABLE SHOWING BY WARDS THE NUMBER AND CHARACTER OF COMPLAINTS ENTERED DURING THE YEAR 1906—*Concluded.*

	COMPLAINTS.	WARDS.																Totals.	
		20th.	21st.	22d.	23d.	24th.	25th.	26th.	27th.	28th.	29th.	30th.	31st.	32d.	33d.	34th.	35th.		
1	Catch-basins, foul or defective	8	8	4	5	2	6	4	5	3	4	5	2	7	4	2	4	138	1
2	Chicken and other fowl nuisances	8	8	1	8	3	9	18	9	14	14	4	21	14	4	11	14	310	2
3	Cow, dog, goat, etc., nuisances	8	8	9	6	1	9	8	14	6	10	5	6	8	9	....	6	232	3
4	Drains, defective and insufficient	25	26	18	9	9	7	14	14	9	9	13	21	19	18	7	8	589	4
5	Flooded basements and yards	36	21	16	10	8	19	8	9	8	12	16	28	18	6	....	8	568	5
6	Foul odors	34	52	21	19	19	36	12	18	16	14	15	7	18	7	14	7	870	6
7	Garbage in buildings, yards or vacant lots	60	66	60	28	19	58	24	28	15	12	29	18	36	10	8	19	1258	7
8	Manure nuisances	11	9	14	26	5	16	12	13	6	3	4	14	12	6	9	8	314	8
9	Noise nuisances	....	....	2	2	1	1	....	2	1	....	1	....	1	....	3	2	42	9
10	Low chimney and smoke nuisances	4	14	8	5	6	6	3	1	2	5	4	1	1	....	7	5	175	10
11	Plumbing, defective and insufficient	25	23	13	12	3	6	7	4	8	4	20	14	28	7	2	8	458	11
12	Privy vault nuisances	15	5	20	11	15	10	10	16	23	35	57	8	30	48	7	24	821	12
13	Lack of or defective roof gutters	17	6	23	23	32	15	13	24	28	20	57	56	25	8	9	8	782	13
14	Defective and insufficient water closets	42	33	31	21	16	17	13	17	28	39	65	15	18	13	9	9	1042	14
15	Insufficient water supply	5	6	11	8	4	9	1	4	8	8	12	14	18	1	4	5	280	15
16	Lack of ventilation	2	3	1	..	....	1	....	....	....	....	....	....	1	1	....	....	48	16
17	Poisonous plants or weeds	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	7	17
18	No lights in halls	2	5	2	2	1	6	1	1	....	....	....	3	3	1	....	....	81	18
19	Miscellaneous	30	34	19	22	15	23	11	14	9	14	19	22	18	16	9	7	715	19
	Totals	332	327	273	217	161	255	159	193	184	203	326	251	275	159	101	142	8730	
20	No cause found for notice	134	123	93	70	41	93	60	95	53	62	84	102	99	53	35	56	2980	20
21	Abatements secured on notices complied with	181	163	157	115	89	120	60	56	97	115	172	115	113	63	37	48	4245	21
22	Complaints not cared for*	17	41	23	32	31	42	39	42	34	26	70	34	63	41	29	38	1505	22
	Totals	332	327	273	217	161	255	159	193	184	203	326	251	275	159	101	142	8730	

*Of the 1505 complaints not cared for, 63 are not reported on and the remaining number have orders pending against them.

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A few instances as to the methods of handling the same are worthy of note:

First. A section of the city comprising twenty (20) acres of swamp holes located upon the lake front and on the north side of the city, known as "Streeterville", was complained of as being a mosquito-breeding spot. A number of notices were served and seven (7) suits were brought, which have caused the place to be filled up and the pest holes abolished.

Second. A condition existing in the down-town district where many occupants of a fifteen- (15) story building were inconvenienced and annoyed by smoke, soot and gases from a neighboring low chimney and smokestack was abated. The accompanying cut shows the condition which existed where the low chimney was a nuisance to the higher buildings shown. The fifteen- (15) story building is shown to the left in the cut, being partially concealed by escaping steam. Subsequent to notice and suit on the part of this Bureau, this large smokestack was raised to its present height; the flanged portion of the stack shows its original height which was at the tenth floor level.

Another reproduced photograph illustrates what was done towards abating one of the worst odor nuisances to be found in the City of Chicago. A view was taken of the top of a three-story malt drying plant which plant daily collected wet grain malt from twenty-six (26) breweries. Upon drying this malt the process invariably emitted a very sour nauseating odor which caused the residents of the neighborhood to enter repeated complaints.

The record of this case is quite extensive. Our trouble with it July 19, 1905. The first suit was brought 9, 1905; the second suit October 9, 1905; the third

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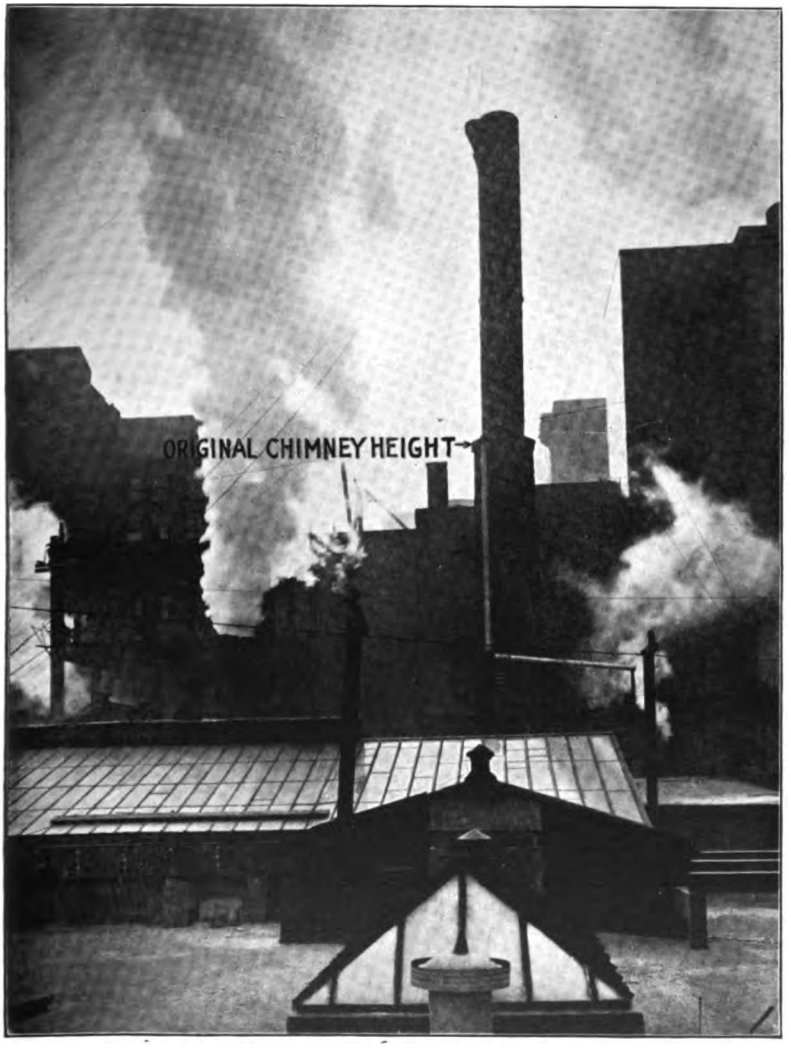

LARGE SMOKE STACK RAISED TO PREVENT SMOKE, SOOT AND GAS NUISANCE TO OFFICE BUILDINGS SHOWN AT THE LEFT, AS REQUIRED BY BUREAU.

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T Box on Top of Malt Drying Plant.

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suit January 6, 1906; the fourth suit June 15, 1906. However, such drastic action as being hailed into court so frequently, failed to accomplish the desired results, and this failing, we resorted to closing the place by police force on April 28, 1906, May 16, 1906, July 11, 1906, August 31, 1906, and December 1, 1906. Each time after being closed, the owner of the premises made a promise that he would operate as directed, but failed in each case to keep his full agreement, whereupon he was closed again pending his further promises. At the present time he is only operating one-fourth of his plant, and is under close supervision by this Bureau.

Prior to securing the condition as shown in which the letter "C" indicates the dust box and "B" indicates the pipe connection from the dryer to the dust box, while "A" indicates the water condenser into which the vapors and gases enter for condensation and absorption, a number of suits in court were necessary and a number of summary actions brought by the closing of the plant under the Commissioner's police powers were required.

The blurred portion of the cut is due to some escape of steam at the time the photograph was taken, blurring on account of long exposure.

In this connection attention is called to the map of the City of Chicago upon which are located fifty-two breweries and malt drying plants of the city. The ten plants indicated thus # are the malt drying ones. Against each one of these plants the following notice has been served. "Provide a water condenser through which all vapors and gases driven off by the process of drying must pass from the dryers, and provide from such condenser a connection leading under the grates of the main boiler of the plant."

In case the water is not used in the condenser as it should be the excessive moisture in the gases will very

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materially reduce the efficiency of the boiler if not put out the fires and leave no steam for drying purposes, therefore the installation becomes virtually automatic and a sure relief. This is one of the sources of odor nuisance which has been ferreted out during the past year, the odor from which was originally charged up against the Union Stock Yards.

As a result of complaints entered against certain buildings the DEPARTMENT found that the only action warranted against the same by the existing conditions was the condemnation of the buildings to be subsequently vacated by the tenants unless existing violations were immediately remedied. Frequently the placing of a condemnation card upon such a building brought about speedy results. However, of the thirty buildings thus placarded, affecting a population of about two hundred and fifty people, four were vacated under police supervision, authority for which is found in the Revised Code of 1905.

Resume of the Year's Work.

The following tabulated statement is a comparative one and, in so far as the items are concerned, is almost self-explanatory:

	1906	1905
1. New buildings examined (based on at least two inspections for each building)	22 057	18 105
complaint	8 102	11 382
mined	4 726	9 172
mined	3 613	1 127
	13 531	10 530
cured	11 928	11 265
parate premises	1 634	1 709
l approved	10 851	10 039
xclusive of re-inspections)	39 445	39 725

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Abatement Details.	1906	1906
Defective plumbing repaired	1 654	1 807
" drains repaired	772	1 003
Ventilation applied to living rooms	60	30
" " " places other than of habitation	38	42
" " " water closet rooms	144	100
Catch-basins built	154	249
" " repaired	224	184
" " cleaned	575	496
Privy vaults cleaned	1 608	1 797
" " abolished	1 168	1 869
Water closets put in	1 627	2 619
Rooms lime washed	385	358
Roof gutters put on or repaired	1 064	2 106
Cellars and basements vacated	61	67
Filthy yards cleaned	2 000	1 414
" cellars cleaned	302	276
" areas, under sidewalks and stairs cleaned	110	125
Unoccupied grounds cleaned	240	156
Manure heaps removed	369	260
Miscellaneous	2 437	2 125

Referring to the foregoing table, it will be seen that 22 037 examinations were made of new buildings during 1906 as against 18 105 made during the year 1905, while there were 10 851 building plans submitted and approved as against 10 039 for the year 1905. These figures are all correct and can be accounted for owing to the fact that many of the new buildings for which plans were approved in 1905 have been completed during this year.

Under the head of "Investigations upon complaints," 8102 were made during 1906, according to the summary, and 11 322 during the year 1905.

Upon examination of the total complaints where the character and number are given with reference to Wards, it is found that the total number of complaints is given as 8730. Each complaint entered here is given a specific number upon the complaint book, subsequent to which special investigations are made. Frequently these complaints have reference to more than one premise, therefore the number 8102 is correct as compared with the number 8730. The

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same explanation holds true for 1905 when 8569 numbered complaints were entered and 11 322 special examinations made. During the past year only 1505, or 17.2 per cent remain unabated. Of the 8569 numbered complaints entered during 1905 only 5 per cent remain unabated.

These facts are worthy of being mentioned and show that this part of the work of the Bureau is not being neglected as was the case in former years, judging from the appearance of a "Stay Book" in existence at that time.

The following is a copy of a letter received from the agent of a building against which a notice was served by this DEPARTMENT:

CHICAGO, Dec. 1, 1906.

MR. PERRY L. HEDRICK,
Chief Sanitary Inspector, City Hall, Chicago.

DEAR SIR: We beg to advise you that the sanitary improvements ordered at No. 225 ..... street will be taken care of as early next week as possible, which we trust is satisfactory.

Very truly yours,

.....

This letter is a true indication of the light in which many notices from the DEPARTMENT are now held by those receiving the same, as this is the usual form of reply received subsequent to the serving of a notice.

Inspection of New Plumbing Pursuant to State Law and City Ordinances.

In order that the existing plumbing ordinances might be made a little more clear and in order that the plumbing standard of the city might be made still somewhat higher, the following amendments were drafted in this office and passed by the City Council

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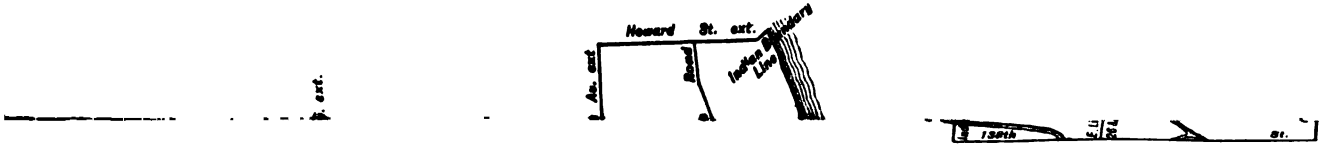

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Amendments to Plumbing Ordinance Passed by City Council and in Effect June 18, 1906.

Be it ordained by the City Council of the City of Chicago:

SECTION 1. That Sections 1616, 1620, 1621, 1631, 1633, 1635, 1639, 1644, 1646, 1647, 1653, 1656, 1658, 1664, 1667, 1680, 1705, 1712, 1713, 1717 and 1728 of the Revised Municipal Code of Chicago of 1905 be and the same are hereby amended so as to read as follows:

1616. STOP COCKS.] Every service pipe shall be provided with a stop cock for each consumer, easily accessible, placed beyond damage by frost and so situated that the water can be conveniently shut off and drained from the pipes.

1620. STEAM BOILER SUPPLY TANK.] All persons are prohibited from connecting pipes whereby high pressure steam boilers may be supplied with water direct from city water mains. All such boilers shall be provided with a tank, or other receptacle of sufficient capacity to hold, at least, six hours' supply of water in case of a pipe district being shut off to repair water mains, or make connections or extensions. In such cases the city will not be responsible for a lack of water for steam boilers, or for any purpose.

1621. NEW PLUMBING — REPAIRS — EXPOSED PIPES AND TRAPS—TESTS.] In all buildings hereafter erected in the city, both public and private, and in all buildings already built or erected wherein any plumbing is installed or wherein any sewer connected pipe shall be repaired or changed, except for minor repairs, on the sewer side of the trap, the drain, soil, rainwater, wherein rainwater pipes are within buildings, waste pipes, or any other pipe or pipes connected directly or indirectly to any drain, soil, or waste pipe, and all traps, shall be placed within buildings and exposed to view for ready inspection and test and shall remain so exposed until approved by the Commissioner of Health. In no case shall a trap be inaccessible at any time.

1631. CLEANOUT—NO PIPE TO BE TAPPED.] On soil or waste pipes 4 inches or more in diameter heavy brass cleanouts, not less than 4 inches in diameter, shall be used. Where iron drain, soil, waste or vent pipes are drilled and tapped, brass plugs or brass soldering nipples shall be used.

1633. FLOOR RESTS ON VERTICAL LINES.] Vertical lines of soil, waste or other pipes, or rainwater pipes when within buildings, shall be provided with floor rests at intervals of every second floor.

1635. PROHIBITED FITTINGS.] No double hub or straight crosses shall be used on horizontal or vertical lines. The use of bands, saddles and sleeves are prohibited.

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with any water closet trap, lead bend, vent or revent connection for same, except that a waste connection may be made to a lead bend in old or repaired work.

1658. SIZE OF VENTS DEPENDS ON STORIES.] The main vent pipes for traps of water closets in buildings four stories or under shall be at least two inches in diameter and have two-inch revents, except that revents for the traps of other plumbing fixtures may be the same diameter as waste traps. In buildings more than four stories high and not more than six stories high the main vent pipes for water closets with or without other plumbing fixtures shall be at least 2½ inches in diameter. In buildings more than six stories high and not to exceed 18 stories the main vent pipes for water closets with or without other plumbing fixtures shall be at least three inches in diameter. In buildings more than 18 stories high the main vent pipe for water closets with or without other fixtures shall be at least four inches in diameter. The main vent pipe for other fixtures than water closets in buildings four stories and under shall be at least two inches in diameter. In buildings more than four stories high and not more than eight stories high the main vent pipes shall be at least 2½ inches in diameter. In buildings more than eight stories high the main vent pipe shall be at least 3 inches in diameter, except that the diameter of the vent pipe may be reduced to 2½ inches for the six lower stories; Provided that where the waste pipe for fixtures other than water closets exceeds 3 inches in diameter the main vent pipe shall be at least 3 inches in diameter. The size of revent to traps of plumbing fixtures other than water closets shall be at least the same size as waste to traps.

1664. LENGTH OF HORIZONTAL VENT.] Except in office buildings and in factories the vent pipes from any fixture or fixtures reconnected as hereinbefore provided, shall not span a horizontal distance to exceed 20 feet in length. In office buildings and factories this distance shall not exceed 40 feet.

1667. REVENTS FOR ADJOINING FIXTURES.] Where bath rooms are located on opposite sides of a wall and directly opposite each other and on the same floor in any building and have a common soil or waste pipe in the same separating wall, the revents from fixtures in either or both of such bath rooms may connect into the same pipe.

Where two plumbing fixtures other than water closets waste into a double "Y" or double "TY" fitting, a single proper revent connected at or near the junction of the two waste lines forming a part of the fitting will be permitted.

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1680. WATER CLOSETS UNDER SIDEWALKS.] Where water closets or other plumbing fixtures are placed under a sidewalk, street, alley, or other like place, adjoining and opening into the basement of any building, each and every fixture so placed shall be ventilated in the same manner as provided for other plumbing fixtures in this chapter, and the water closet compartments shall be adequately lighted and ventilated.

1705. REVENT OMITTED. WHEN.] Where a single water closet or other plumbing fixture is located in a building or on the top floor of any building, and there is an adequate soil or waste pipe of undiminished size from ground (in building) to roof, the revent pipe may be dispensed with; Provided, that for water closets a non-siphoning trap tested and approved by the Chief Sanitary Inspector, or a closet of approved construction is used for such work; and provided, further, that the trap of such fixture is located not more than five feet from such soil or waste pipe.

SECTION 1712.] All earthen ware and closet traps shall be connected to waste or soil pipes by inserting heavy brass floor or wall flanges, not less than ½ inch in thickness where lead bends are used, and shall be soldered to the same, and bolted to the trap flange.

Where brass or iron bends are used, brass or iron flanges not less than ¼ inch in thickness may be used, and shall be screwed or calked to the same and bolted to the trap flange, and all such joints shall be made tight without the use of putty, cement. plaster, rubber, or leather washers. The use of putty, cement, plaster, rubber, or leather washers is hereby prohibited in making all connections between traps of plumbing fixtures and soil or waste pipes.

No flange, iron bend or gasket connection shall be used until it has been approved under test by the Chief Sanitary Inspector. One of each of the above type of gaskets, flanges and iron bends shall be kept on exhibition in the Sanitary Department.

1713. SLIP JOINTS — GROUND JOINTS.] Slip joints shall not be permitted on the sewer side of any trap, unless the metal connection is required between the soil or waste pipe and tile sewers. Unions on wrought iron, soil, waste and vent pipes shall be made by means of metallic brass-seated ground unions, or flange unions with sheet lead gaskets, and made without other gaskets or packing.

1717. INSPECTION OF REPAIRS.] The following repairs and extensions to any part of the plumbing and drainage system in any building shall also be reported for inspection, viz.: where there is any change in any sewer connected pipe,

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and where such change is on the sewer side of the trap, except in the case of minor repairs.

1728. FEE BEFORE PLANS ARE APPROVED.] Before plans are approved the following fees for inspection shall be paid to the City Collector:

When the building contains from one to six plumbing fixtures, the sum of fifty cents shall be paid for the inspection of each fixture, and for each and every additional fixture thereafter installed, or for which waste or vent fittings are installed, the sum of twenty-five cents shall be the fee for inspection.

Increased Inspections and Fees.

The work of this year on plumbing inspection has been unusually large. The number of inspections for the year exceeded those of last year by 3932 inspections, an increase of 21.1 per cent.

Under this heading may be considered the collection of fees for plan approval. The total amount collected for the year was $32,264.00, which is authorized under Section 1728 of the Revised Code of 1905. While this amount does not meet the expenses of the office for the year, it is that much in excess of what was ever turned into the city treasury in any previous years with the exception of last year when a small amount was collected. The subject of plumbing is one that does not lend itself particularly to discussion, the important features being the enforcement of the ordinances with reference to new plumbing installations and with reference to the supervision of the alterations of old plumbing systems. Much has been done towards placing the plumbing of old buildings in sanitary condition as will be gleaned from a perusal of the yearly detailed report. The endeavor has been to enforce the penalties against the plumbers who have done work in violation of the city ordinances as to choice of materials, for failure to notify for inspection and test, and in two cases recommendation was made for the revocation of plumbers' State certificates, which amount to a license to do plumbing work.

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In the advance made in plumbing installations in Chicago, attention is called particularly to the discussion of public school installations, to that of the meat handling plants of the Union Stock Yards and to that of the Police Stations. In each of these the highest of standards have been set. The work at the Union Stock Yards along the plumbing and drainage line has made it necessary to keep that district supplied with inspectors, one all the time, and two inspectors part of the time during the past six months.

An important opinion was asked for and received from the Corporation Counsel's office relative to the enforcement of certain plumbing inspections.

Under an opinion given, it has been made clear that the DEPARTMENT has the authority under the State law and under the city ordinances to call upon the Department of Police to stop the installation of plumbing work where the same is being done in violation of the specifications of the city ordinances governing plumbing, and also has power to stop any work which by its progress will interfere with the proper inspection or testing of plumbing and drainage installations.

These are important powers to be exercised in the interest of good sanitation, and the exercise of the same will also protect the innocent builder against any purposed violation on the part of the contracting plumber. The exercise of these powers will also bring about speedy results and avoid the long delays incident to legal proceedings against the violator of the city ordinances.

Cleaner and Sweeper System.

During the past year an entirely new condition of plumbing installation and sewer connection arose which gave rise to much discussion and dispute especially between parties who claimed the trade right to install the same.

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Reference is made to what is known as the "Cleaner and Sweeping System" when that is installed in office buildings to be used for scrubbing of floors and for the removal of dust from upholstering of furniture and from rugs and carpets.

This office rendered the opinion that under Section 1715 of the Revised Code of 1905, which reads in part: "The installation of any sewer connected fixture or of any sewer connected pipe or pipes other than those herein mentioned, or under any other conditions than those herein set forth, shall be as directed by the Chief Sanitary Inspector and the same shall be covered by special permits issued by him."

This work should be installed by certified plumbers and should be under the inspection and test and in the presence of inspectors from the DEPARTMENT OF HEALTH. While the courts have not passed upon this point, an arbitration committee appointed by the contesting trades organizations decided along the lines heretofore set forth, which are more specifically to this effect, that the wet cleaner system is one in which water is used for any of its purposes and for which there must necessarily be a sewer connection, such work being under the direction of this DEPARTMENT.

There is only one other cleaner system, and that is what is commonly known as the dry system and which does not have water used in any portion of the same, and which, of course, has no sewer connected pipes in its installation.

The city Laboratory was called upon to make a test of natural "Alberene" stone, used in plumbing construction, as to its impermeability and serviceability as a material out of which to construct plumbing appliances. These facts are mentioned to show that the endeavor is at all times to know that the provisions of the ordinances are being met with and to further bring to light the fact that the movement in these as well as in other lines has always been forward and towards perfection.

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The City Hall itself is the chief violator of the plumbing and drainage ordinances of the city. To determine the condition of the sewers and plumbing within this building, the following important investigation was made by placing a test upon the same. The report of the test follows.

Report on Sanitary Condition of City Hall.

CHICAGO, October 24, 1906.

CHAS. J. WHALEN, M. D.,
Commissioner of Health.

DEAR SIR:—On Monday, the 22d inst., I had a smoke test made of the plumbing system in the north half of the City Hall. The main sewer and the laterals are so defective that it is impossible even to make a thorough test. The test as placed shows that the main sewer is trapped in places and leaks in others. The test also shows that some of the laterals are trapped due to the sinking or settlement of the lateral sewers, and shows that some of these are broken. No test was placed on the south half of the building drainage system for the reason that some work has been done there and some of the pipes at present are disconnected. However, sufficient information is at hand to warrant me in saying that the drainage system of the City Hall is in a more deplorable condition than is that of any other building which has been brought to my attention in this City. Observation at the time of making the test disclosed the fact that the smoke soon traveled through all the rooms and corridors in the north part of the building, proving conclusively that wherever the smoke was seen or the odor smelled the gases and foul air of the drainage system at other times permeated. There has been no work in progress towards alleviating the present condition for several weeks. The season is at hand when the building will soon be steam-heated and the windows and doors more generally closed, imprisoning within its walls immense volumes of poisonous air. Complaints have recently been made to me from other departments of the telling effect at the present time of the breathing of this polluted atmosphere upon the general health. The results of this partial smoke test shows that this air pollution is of so great a magnitude as to warrant the most drastic procedure upon the part of the Commissioner of Health to protect the lives of those employed in this building * * * *.

Very respectfully submitted,

PERRY L. HEDRICK,
Chief Sanitary Inspector.

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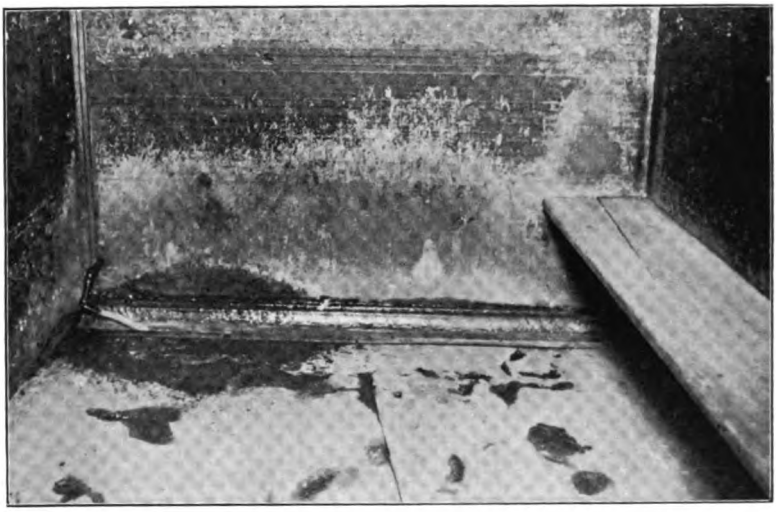

VIEW OF MEN'S CELL ROOM IN POLICE STATION, SHOWING OLD STYLE OPEN DRAIN.

VIEW OF TOILET ARRANGEMENTS IN WOMEN'S CELL ROOM IN POLICE STATIONS.

TYPE OF CLOSET NOW BEING INSTALLED IN POLICE STATION CELLS.

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In order that the health of the employes of the City Hall might be best conserved, the following notice was served upon the heads of departments and bureaus within the structure:

CHICAGO, October 25, 1906.

DEAR SIR: Owing to the extremely vitiated condition of the atmosphere of the City Hall, due to the addition of large volumes of sewer air and nauseating odors from the disrupted drainage system of this building, you are hereby notified, in the interest of the health of all those in your employ, to ventilate your department by the admission of as much fresh air as possible from the outside.

Very truly yours,

PERRY L. HEDRICK, C. E.,
Chief Sanitary Inspector.

CHAS. J. WHALEN, M. D.,
Commissioner of Health.

Police Stations.

After having attention called to the conditions existing in some of the cell rooms of the police stations, a general inspection was ordered of all such stations within the city. The submitted views show clearly what sanitary arrangements are at present provided in the majority of station cells. These, certainly, are the most primitive. On account of such arrangements, the cell rooms, many of the court rooms above, together with adjoining rooms upon the same floor level, are made very foul and offensive. Certainly these cell arrangements are repulsive enough to keep a man out of jail a second time; one lesson being sufficient. There is placed in contrast with these present station cell views, the type of plumbing ordered by the Bureau to be installed in the overhauling of these stations, and the same type of fixture has been ordered to be used when new ones are erected. This fixture is installed in such a manner that it is virtually automatic in its action. No seat is provided. The lid shown is simply a cover made to fall down when not held in the position shown. When the cover falls, the closet is flushed. This type of fixture is non-absorbent and impervious, and so strong in its construction as to be unbreakable.

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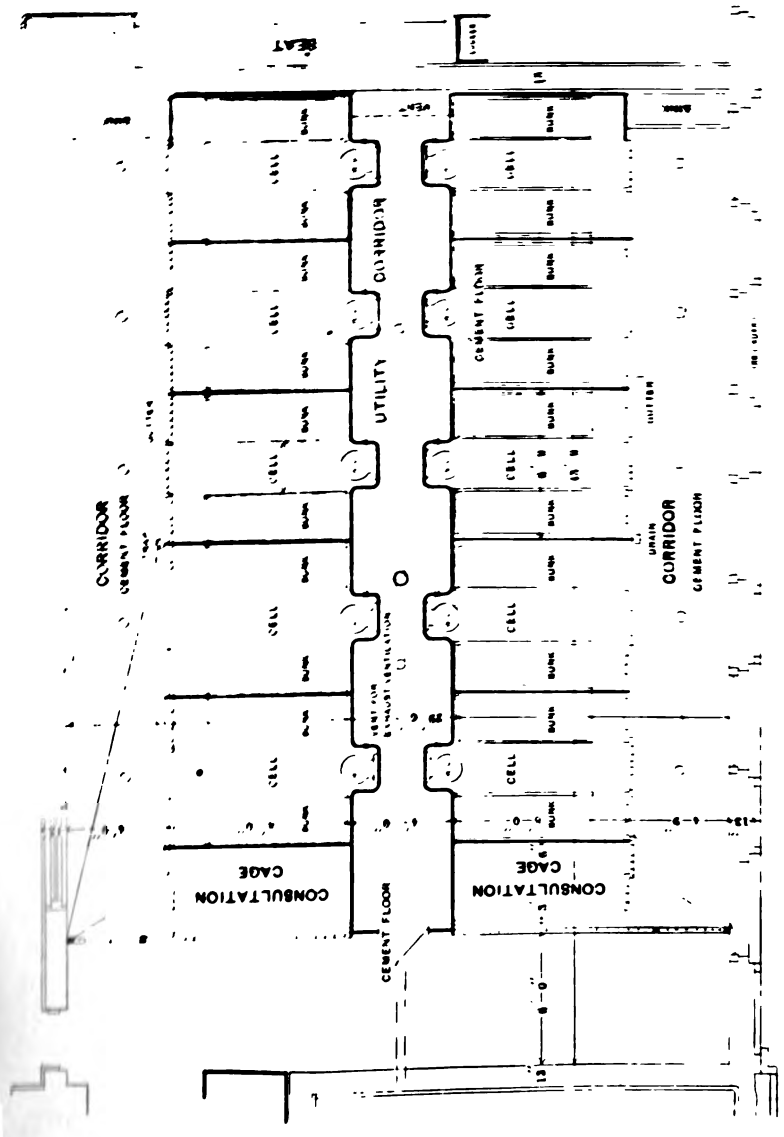

PLAN OF AN APPROVED CELL-ROOM ARRANGEMENT.

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The accompanying plan of a cell room arranged according to my instruction, so far as the sanitary features are concerned, has the following improved features worthy of note: A half-niche system is arranged for the plumbing, and from this niche through the ventilating openings a constant current of air is drawn into the utility corridor, which is entirely closed except for the connections from the ventilating openings from each niche, and for its connection to the ventilating flue or duct, which, in some cases, is provided with a heating coil to cause a constant upward draft, and in others a motor-driven exhaust fan will be placed. The capacity of the ventilating duct is sufficient to allow of the perfect ventilation of a cell room, including corridors, through the openings provided in the niche walls and through the openings provided in the vent ducts above the top of the cells. Adequate light is provided by means of the windows. On account of the graded and pitch cement floor each cell and all of the cell room can be at all times flushed and cleaned through the drain connections.

There are about six hundred (600) prisoners locked up in the cells in Chicago every twenty-four (24) hours, and they remain there on the average about sixteen (16) hours. On this account it is not desirable to place any washing facilities within the cells, the detention of the prisoners being of too short a duration. As 60 per cent of the arrests are for drunkenness the time of incarceration is about equal to the sobering up period. Drinking water for the prisoners will be provided in the usual manner.

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In the forty-two police stations there are three hundred and six (306) cells. Twenty-eight (28) of these police stations have the cells fitted up with the type of sanitary arrangement as is shown in the accompanying cut which is only a gutter in the floor at the rear of the cell into which a small stream of water is playing. The remaining fourteen (14) stations have sanitary arrangements as shown in the cut, which is an old style and antiquated type of fixture but which is a typical one of the women's cells.

Aside from orders having been issued covering these conditions, fifty additional notices were served covering the repair of plumbing work throughout the entire building, providing for ventilation for cell rooms, and replacing present floors with those of non-absorbent material.

It can be stated from information gained from the inspection of the cell rooms of other cities that Chicago is soon to have the most modern and best sanitary arrangements to be found anywhere.

[illegible]

An inspection has been made of [illegible] of the public schools with the [illegible]. These inspections were [illegible] ninety-one (91) school buildings, for the reason that each group of buildings is termed one school district. The tabulated list gives the [illegible] of inspections and the kind of notices served upon the Board of Education on account of the insanitary conditions [illegible] of public schools.

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Number of Inspections, Number and Kind of Notices Served on Public Schools.

Number of Inspections	91
Number of Notices served	21
Nature of Notices—	No. of each served.
To provide temporary cups, or chains for cups, or both	7
To provide suitable garbage cans with covers	2
To purify air by a water wash for ventilation	2
To clean water faucets	1
To ventilate toilet rooms	5
To repair leaks in flush pipes to toilets	2
To make air tight ventilating stacks in toilets, so as to prevent foul air from toilet rooms entering class rooms.	5
To separate drinking water rooms from toilet rooms	1
To ventilate class rooms	1
To abolish present toilet fixtures and replace with new	20
To install or repair new closets	8
To repair steam heating pipe	1
To not allow garbage to be collected in coal scuttles	1
To drain and fill in yard	1
To clean toilet fixtures	1
To repair and connect down spouts	1
Total violations	59

In this connection it is not desired to enter harsh criticisms upon the methods of the Board of Education, yet, attention is called to three important classes of notices, the first being the lack of proper ventilation of toilet rooms. In many cases, an indirect heating system was found for ventilating some of the class rooms consisting of a heated ventilating flue, and into which only the outside air was to be admitted, but on account of the location and structural conditions of the ventilating flue the foul odor from the toilet room was drawn into the same, and subsequently permeated the class rooms. In other instances, where no mechanical appliances were used for the forcing of air into the room, or for exhausting foul air therefrom, the conditions of ventilation were bad; the floors were cold and the air stuffy. In two specific cases the source of air supply was a dust laden one, and it will be necessary in these cases to pass the air

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through a water washing device in order that all impurities may be removed therefrom. As the condition now exists the floors are soon covered with dust which settles from the air supplied to the rooms by the ventilating systems.

The third point has reference to the old type of plumbing fixtures formerly used. They are inferior in their construction, imperfect in their operation and frequently a source of nuisance to the entire school. In all of the grade schools there are fixtures used which are of the illustrated type and shown under the heading of "Old Type of Fixtures Used in the Schools." The cut appears to a better advantage than conditions really warrant. The difficulties encountered in cleaning the same allows them to become foul and offensive. This is partially due to the fact that they are long troughs, twenty feet or more in length, and contain little or no water.

Attention is called to a communication sent to the President of the Board of Education with reference to drinking fountains, advising the abolition of the old time drinking cup, which is used frequently and by numerous pupils, and probably washed at irregular intervals, and which likewise is a menace to those using the same.

Many of these drinking cups were found cast about the room and lying loose in the wash sinks. A hygienic type of drinking fountain as shown, the important features of which are the absolute prevention of contagion on account of its being only possible to drink from the bubbling fountain of water, was recommended for immediate adoption. The arrangement is perfectly sanitary for the reason that the cup portion is always kept moist by the continuously flowing water, which is only small in amount when not in use, and by reason of the fact that water is continually passing over and submerging the cup when a drink is being taken.

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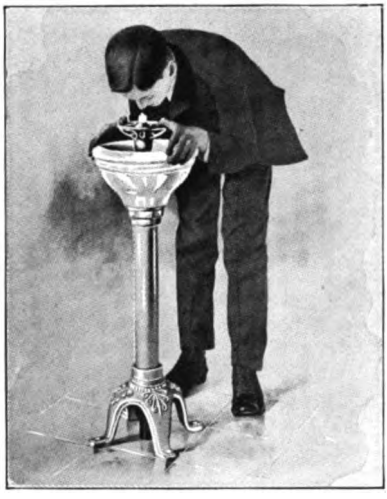
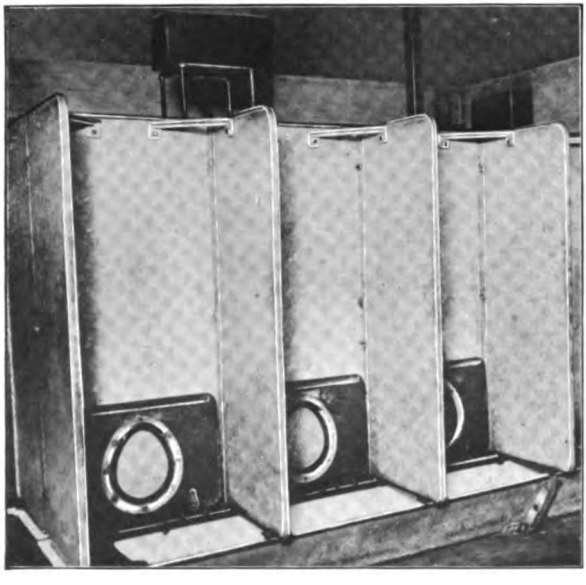


TYPE OF DRINKING FOUNTAIN RECOMMENDED TO BOARD OF EDUCATION FOR USE IN SCHOOLS.



OLD STYLE RANGE OR TROUGH CLOSET IN SCHOOLS NOW BEING REPLACED BY MODERN TYPE.

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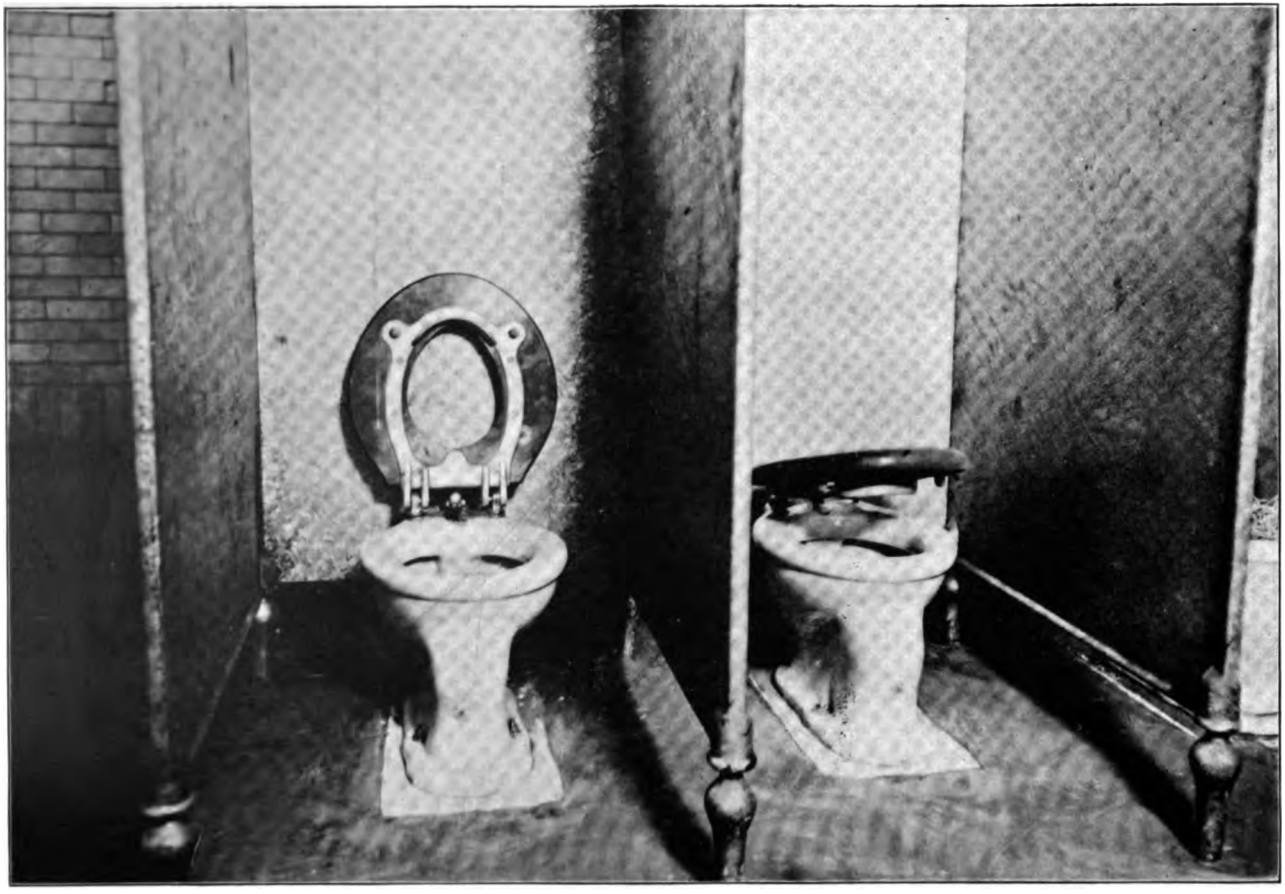

TYPE OF INDIVIDUAL CLOSETS NOW BEING INSTALLED IN PUBLIC SCHOOLS.

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This type of drinking fountain can be easily applied to any of the present drinking water connections, and admits of ease of installation.

The amount of water wasted at any school during the day would not entail an expense to exceed a few cents, a small price to pay for protection.

In the discussion of this subject it is important to call attention to the improved condition existing in the public schools today, as compared to those of former years. By this is meant the compulsory adoption of a higher grade and more sanitary type of plumbing fixture than was the School Board's custom during past years. This change just now being observed, is owing to the fact that the school buildings just being completed are the first ones to be built in compliance with the provisions of the 1905 Revised Code. This type of fixture is shown as "The Modern Type of Fixtures Required for School Use." In contrast with "The Old Type of Fixtures Used in the Schools" is shown an installation according to the Revised City Ordinances. (The plumbing ordinances containing these governing conditions were drafted in this office.)

It is just to state here that for all High School work the past custom has been to use individual fixtures.

Primarily considered, our public school system was instituted to furnish the children of our city with opportunities for their education and training. Now, certainly that instruction and training is far from complete if, in addition to their instruction in hygiene, they are not taught by observation what are the most desirable and highest types of plumbing appliances. Certainly the best are none too good for school installations. The defects of the old types are commonly known, and it is not worth the time to recount them here.

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Inspection of Meat Handling Plants in the City of Chicago.

Upon April 12, 1906, an inspection of the meat handling plants of the city was begun, taking first those of the Union Stock Yards district. The purpose of the inspection, begun April 12, 1906, was to determine the conditions under which women are employed in the various packing plants of the city. The inspector assigned to this work was instructed, after making some preliminary reports in regard to the same, to make the investigation broader and to search out the insanitary conditions wherever they might exist. Following this, upon June 5th, this force was again increased by the Chief Sanitary Inspector accompanying two additional Rendering Plant Inspectors to the yards. Shortly after the beginning of our inspection the celebrated Neill-Reynolds report became public, and as a result all eyes were turned upon the Union Stock Yards, and much interest was taken in the reports upon the various plants made by this Bureau. Our inspections were completed, orders given and compliance had therewith prior to National legislation governing meat handling plants. It is to be said to the credit of the Bureau that its regulations were found to be even more stringent than those imposed by the Federal government. In no case were any additional orders given, the sanitary nature of which were more stringent than those imposed by this Bureau, and in some cases the Federal officials passed, as satisfactory, conditions which we deemed should be changed.

Investigation was made of conditions of floors, walls, ceilings, natural and artificial lighting of buildings and the ventilation of the same, the conditions of tables, utensils, mechanical appliances, and methods of slaughtering and the care exercised in the handling of meats; the habits, methods

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and appearance of dress of employes and the provisions made against infection from any source. Everywhere observation was made of the care of tables, carts, or other arrangements used for the handling of meat products. The condition of toilet rooms, wash rooms, locker rooms, lunch rooms, and the provisions made for the general betterment and welfare work were investigated. The conditions found in the various plants have been chronicled through the daily press and any recital of the same would be but a repetition of what has already been made known.

The scope of the investigation and the conditions remedied can be best gained from a perusal of the following copy of the general orders issued against all meat handling plants:

General Orders Issued Against All Meat Handling Plants in Chicago.

You are hereby notified to comply with and conform to the following general regulations within the time specified in each order:

1. Provide proper and adequate toilet facilities in accordance with the following Sections of the Revised Code of 1905: Sections 1681, 1684, 1700, 1701, 1702, 1703, 1719, 1722, 1723, 1724 and 1725. A pamphlet containing these Sections will be mailed to you under separate cover. The time given for compliance is thirty days.

2. Provide general washing facilities for all employes and take means to cause all employes who handle any food product to be cleanly as to personal habits and attire. Particularly see that all employes wash their hands before beginning work after any period of cessation, whether it be before beginning the day's operation, after the lunch hour, or after the use of the toilet. Provide in addition to washing facilities, soap and towel as may be needed.

3. Place cuspidors upon all floors and in all departments wherever a food product of any description or material is prepared or handled. Cuspidors must be regularly and effectively cleaned at intervals not to exceed twenty-four hours each. Maintain such supervision and discipline in all departments as will result in the use of these cuspidors.

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4. All employes must at all times be cleanly in habits and attire. The use of burlap or other like material for aprons is prohibited. Oil cloth or rubber aprons must be provided where practical for the employes who work at slaughtering, cleansing, pickling or curing of meats. All other employes who handle meats or food products must be daily provided or furnished with proper clean cloth frocks, aprons or jackets as the character of the work may demand.

5. All tools used in the preparation of edible products must be thoroughly washed and disinfected after each day's use. All hot water boxes or pails used in the tempering of knives in the pork cutting rooms must be thoroughly cleansed after each day's use. All tables, benches, trucks, carts, fresh meat conveyors, chutes, barrels, tierces, tubs, pails, cans or other articles used in the preparation or handling of edible products must be thoroughly cleansed before and after each day's or period's use. All chutes and conveyors must be kept in a clean and sound condition.

6. All floors, gutters, drains, posts, walls, cans, or portions of any abattoir, must be kept in a thoroughly clean and sanitary condition.

7. The floors of all stock pens within or adjoining buildings must be well drained, and made of impervious materials. All shackling pens, sticking pens, slaughtering floors, offal or gut room floors, meat washing rooms, tankage press rooms and toilet rooms, must be provided with floors made of an impervious material. Impervious floors or drip pans must be provided for offal coolers. The ground floors of buildings, where meats are not handled in tightly enclosed packages, including the ground floors of all cellars and coolers, must be made of impervious material. Make sticking pen walls of impervious materials.

8. All drains, including the cellar floor drains leading from the building to sewers or catch-basins, must have their outlets properly trapped by a water seal at the catch-basin located between the sewer and the building.

9. All floor drains or gutters must be made of cast iron and when placed properly set in tar. All floor gutters are to be left free and unobstructed in order that they may be readily cleaned.

10. The bottoms of all elevator shafts, scale pits and spaces under loading docks or platforms, must be regularly cleaned and maintained in good sanitary condition.

10½. All plank roadways or walks, where the same are placed upon the surface of the ground, must be removed and in their places must be laid proper stone or brick or other

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standard pavements, so arranged as to be properly graded and drained.

11. Hog hair boxes and chutes, paunch manure and blood vats must be made of non-absorbent material. All floors or pavements beneath or surrounding the same, must be made of the same material. Such floors must be well laid and graded, and provided with proper sewer connections. All track areas where paunch manure or other foul material is loaded upon cars, must be imperviously paved and properly drained and maintained in good sanitary condition.

12. All wooden sewers or drains and wooden catch-basins must be abolished. Where such sewers or drains are abolished, proper tile or cast iron sewers must be provided. (Where hot liquids or wastes enter private sewers or drains the use of extra heavy pipes for the same is recommended and such runs should be provided with water-tight manholes or rodding basins.)

All catch-basins or skimming basins must be constructed water tight and built of either brick or concrete. They shall be provided with sets of screens of proper mesh to keep solids from entering the public sewer.

13. In all cutting rooms provision must be made for washing all cuts of meat that may be soiled by falling upon the floor or otherwise before being used. All *scraps* of meat whether raw or cooked which become soiled must be separately collected and disposed of as non-edible products. Prevent the careless handling of all food products. Prevent all employes from climbing upon or sitting upon work benches or tables.

14. Provide lunch rooms and dressing rooms for the use of employes. Work rooms must not be used as dressing rooms and the wearing apparel of the employes must not be permitted to hang therein. All female employes must be provided with seats or stools and must be allowed the reasonable use of the same during the hours of employment. Women's dressing rooms must be furnished with a couch.

15. Post signs in conspicuous places in such languages as may be required regarding sanitary regulations. Devise means for the enforcement of all these regulations.

16. All sausage meat trimming or meat cutting for canning purposes must be done in adequately lighted (natural light) and ventilated rooms of moderate temperature.

17. In order that all refrigerated rooms may be as dry as possible, either of the following systems of refrigeration must be adopted: the curtain or open brine system or the direct expansion or forced draft system.

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Suggestions:—Metal frame tables with wooden one-piece top or cutting board are recommended in place of the entire wooden tables. Metal trucks and cars, or those of impervious material, in place of wooden ones are recommended. Shower bath facilities are recommended to be installed for the use of employes of slaughtering and offal floors. Hygeia drinking fountains are recommended for all departments in order that the drinking cup may be dispensed with. These suggestions are offered merely as suggestions, and the compliance therewith is not required.

NOTE.—The question of cutting and trimming meats in rooms of moderate temperatures is objected to by some, the claim being made that the meats deteriorate under the action of heat. Nevertheless one of the largest packing houses in the yards cuts and trims meat during all periods of the year in ordinary atmospheric temperatures.

If investigation shows that the temperature of the cutting and trimming rooms can, without serious harm, be kept at a temperature of some fifty degrees F. instead of thirty-two degrees F., the same will be required in order that the employes may be allowed to work under more satisfactory conditions.

A table has been prepared showing the number and kinds of plumbing fixtures installed in the various plants in the Union Stock Yards. In this connection it is very proper to call attention to the conditions that existed prior to the making of investigation of the plants. The toilet arrangements were as shown in the reproduced cut. This view was taken of the exterior of an outside toilet, which was nothing more than a primitive type used before modern plumbing appliances were invented. This type was found to exist in all appliances and was used by the majority of the male employes. With due credit it should be stated that a type of fixture somewhat similar to that shown as the old type of school range closet was provided for the women's toilet rooms, and in some cases the same was provided for the use of men.

The inspection in the Union Stock Yards did not cease with the investigation of the meat handling portions of the plants. The parts of the plants, no matter for what purpose

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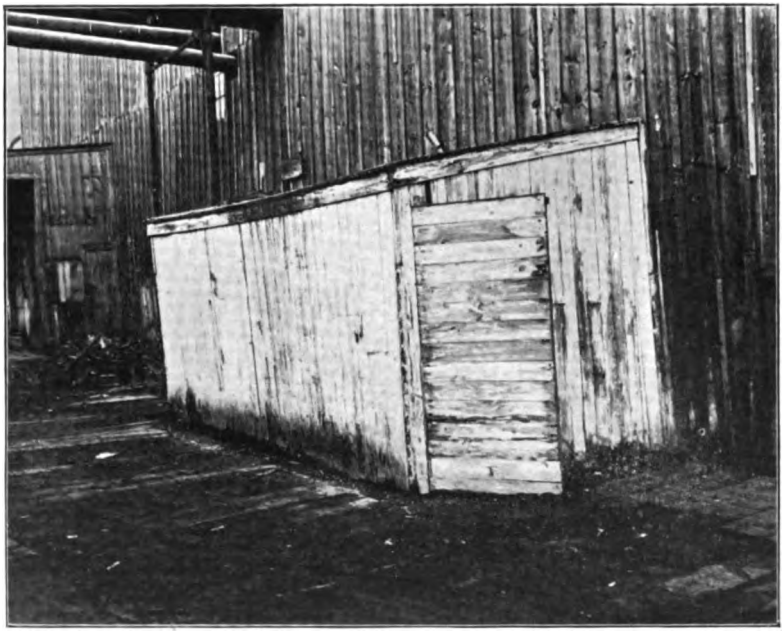

EXTERIOR VIEW OF PRIMITIVE TOILET ARRANGEMENTS PRIOR TO INVESTIGATION OF SANITARY CONDITIONS AT STOCK YARDS

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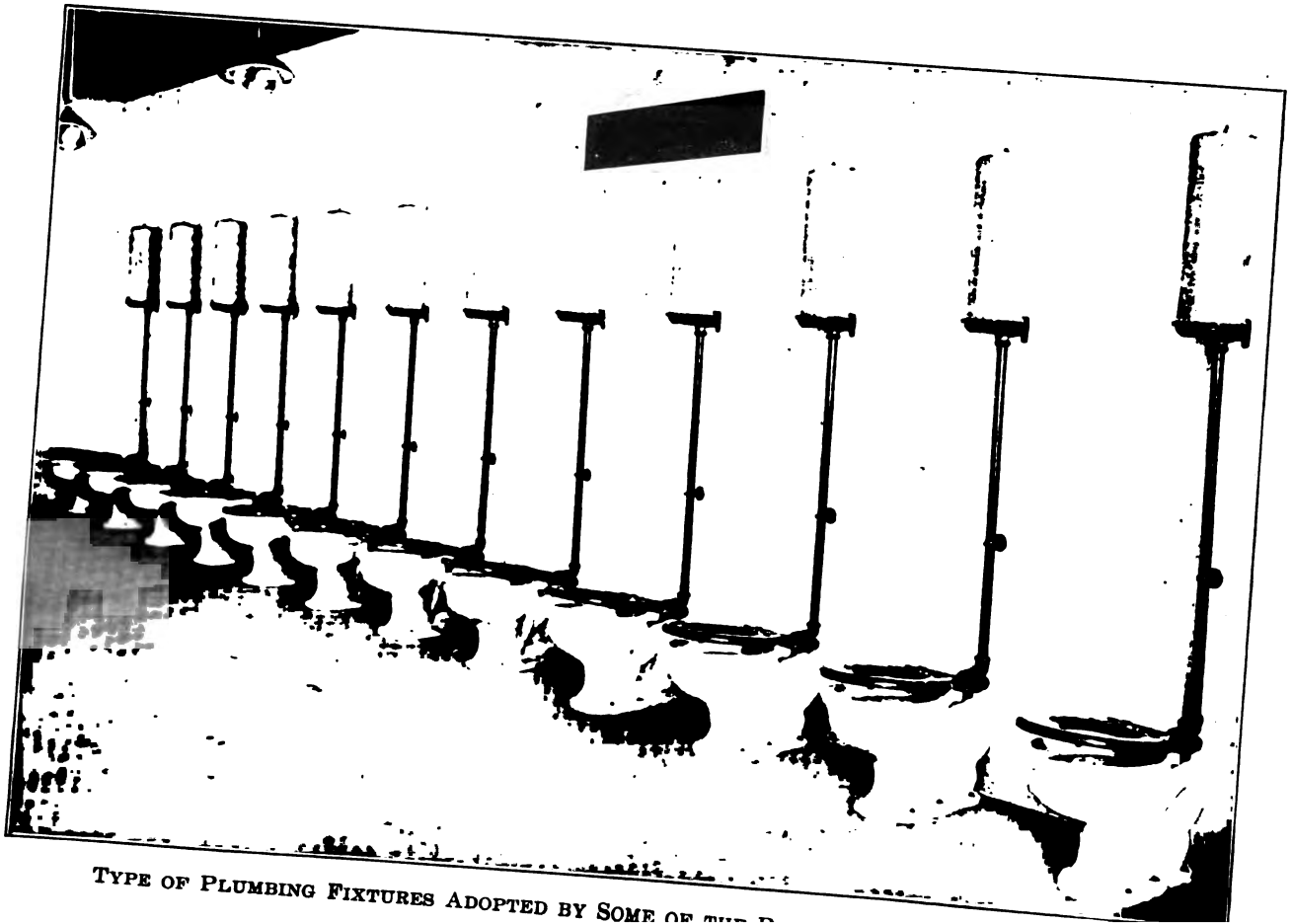

TYPE OF PLUMBING FIXTURES ADOPTED BY SOME OF THE

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used, were inspected, and the same sanitary conditions have been made to apply in these and was insisted upon in the other meat handling portions.

In contrast to the former primitive type of sanitary arrangements, is reproduced a cut showing the type of toilet fixtures adopted by many of the plants. This view was taken before the enclosing partitions were erected. The fixtures used are of the highest type to be found upon the market, and are excelled by none.

Plumbing Fixtures Installed in Packing Plants at Union Stock Yards.

PLANTS.	FIXTURES.							EMPLOYES.			
	Water Closets.	Urinals	Basins.	Sinks.	Bath Tubs.	Shower Baths	Total.	Male.	Female.	Total.	Rest Rooms.
Libby, McNeil & Libby	78	6	50	....	....	....	134	445	790	1235	6
Schwarzschild & Sulzberger	76	20	56	3	1	11	167	1375	178	1553	6
Omaha Packing Co	32	19	17	....	....	....	68	599	52	651	3
Anglo-American Prov. Co	57	21	28	....	1	....	107	1055	155	1210	4
Nelson Morris Co	199	73	84	....	....	....	356	2914	393	3307	14
Boyd, Lunham & Co	16	6	9	....	....	....	31	218	8	226	1
Swift & Co	120	38	59	12	1	....	230	1938	443	2381	9
Continental Packing Co	3	1	2	....	....	....	6	43	.....	43	....
Hammond Packing Co	41	11	17	....	1	....	70	416	50	466	2
Thomas Thorlison	3	1	3	....	....	....	7	22	1	23	....
Hateley Bros	4	3	3	....	....	....	10	30	.....	30	....
H. Boore & Co	16	8	8	....	....	....	32	200	.....	200	...
North American Prov. Co	3	2	2	....	....	....	7	20	.....	20	....
Western Packing Co	15	12	13	....	....	....	40	208	1	209	....
Adam Stecker	3	.....	3	....	....	....	6	20	40	60	1
Independent Packing Co	5	1	1	....	....	....	7	70	.....	70	....
Adler & Oberndorf	3	2	2	....	....	....	7	33	.....	33	....
Armour & Co	411	106	314	....	....	15	846	5259	2021	7280	
Total	1085	330	671	15	4	26	2131	14865	4132	18997	62

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Work is also under way to make provisions for 600 more employes than are shown in the tables.

The work is designed on account of new building construction in the Lacey, McNeil & Libby and in the Smith & Co. plants.

Some of the plants adopted what is known as the "automatic syphon range closet," being the only closet of that type permitted under the city ordinances, and a fairly good one for low grade help.

In contrast with the lack of washing facilities is shown a view of a wash room now duplicated by all of the plants. This is a view of the same room just previously mentioned where the view was taken prior to the erection of the enclosing partitions.

As a result of our orders and suggestions, all of the plants employing women provided rest rooms for their use. It should be stated here that while the provision for rest rooms for the use of women was embodied in the general orders, the providing of the same is not obligatory under the city ordinances, except that the same might be indirectly so inasmuch as the hanging of wraps and clothing within rooms used for the handling or preparation of meats would be considered insanitary and on that account prohibited.

All of the plants which chose the highest types of plumbing appliances, and in that respect exceeded the demands of the ordinances, are entitled to due credit, although when the Bureau was consulted it advised the choice of such fixtures as are shown in the cuts, although the privileges under the ordinances were not obscured.

In addition to the cuts just mentioned there is shown a typical rest and lunch room. Such rooms have been provided by all of the plants employing women or girls, for their use, comfort and convenience.

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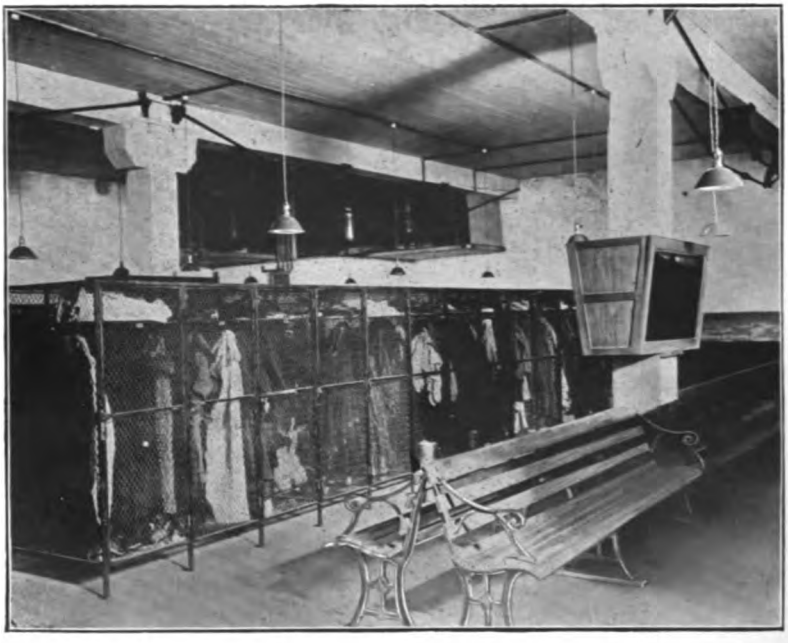
MODEL WASH AND TOILET ROOM FOR WOMEN INSTALLED IN LARGE PACKING PLANT AT UNION STOCK YARDS.



WOMEN'S REST AND LOCKER ROOM IN PACKING PLANT AT UNION STOCK YARDS.

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Probably no city in the world has had so much welfare work done within so short a time affecting the conditions under which so many people work.

Following last year's attempt to relieve the public of the nuisance occasioned by odors arising from various portions of the slaughtering and rendering plants, there have been accomplished during the past year some results which go a long ways towards that end. Odors of one kind and another, somewhat similar in character, have blanketed portions of the city from time to time. However during the past year only one complaint, designated as a stock yards odor, was made at this office, and upon investigation it was found that that odor was not due to any conditions which existed at the stock yards, because, taking the location from which the complaint was made as a basis, it was found upon investigation that the course of the wind at that time and during twelve hours previous to the entering of the complaint, as verified by the Weather Bureau records, would not permit of any odors from the stock yards quarter being carried in that direction. While no doubt the various packing plants are entitled to criticism for any methods of conducting their business which cause a public nuisance of an odor variety to exist, there are and should be mentioned other sources from which disagreeable smells do emanate. In making a study of this situation two maps are shown, upon one of which are located the slaughtering and rendering plants and tanneries of the city, with detailed information as given. Upon the second are located the various breweries and malt drying plants, any of which may be, when malt is being dried, as offensive as any of the odors described as coming from the stock yards quarter.

The location of the slaughtering, rendering plants, glue, tanneries and malt drying plants is graphically shown upon the maps, and attention is called to their location and

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the conditions under which they may be operated, to more clearly indicate from what source an odor affecting any portion of the city may have had its origin.

During the year a change was made in the method of drying tankage, pressed blood and the other products going to make up the commercial fertilizer, by one of the large plants in the stock yards district. A view is given which, at the point marked "A," indicates where the open top of a low condenser was found to be when the plant was first located by the writer, and this was the first time it was known to exist. In order that an understanding of this plant may be had, the following description is given: In the portion within the building at the left of the cut is a revolving tube dryer forty feet in length and six feet in diameter, into which is fed the fertilizer material to be dried, when the same is worked to the end and toward the right as the dryer rotates, and is dried by the passage of hot air and smoke from the small coal burning furnace situated beneath and in front to the forward end of the dryer. The dried material is loaded into the carts at the position shown in the cut. The smoke and gases upon leaving the dryer enter a dust chamber and are forced from thence by a fan into the bottom of a condenser tower, down through which from the top is sprayed a large volume of water for the purpose of condensing the vapor carried over by the hot air (because the tankage originally carries about fifty per cent of its weight as water) and also for the purpose of absorbing some of the odors. The unabsorbed odors were found to be escaping into the atmosphere, and the same being cold descended into the lower strata of air, almost producing nausea in those breathing the same. Under orders from this Bureau and partially under its advice, the present arrangement as seen was completed. From the top of the condenser the uncondensed vapors passed through the large pipe shown, downwards,

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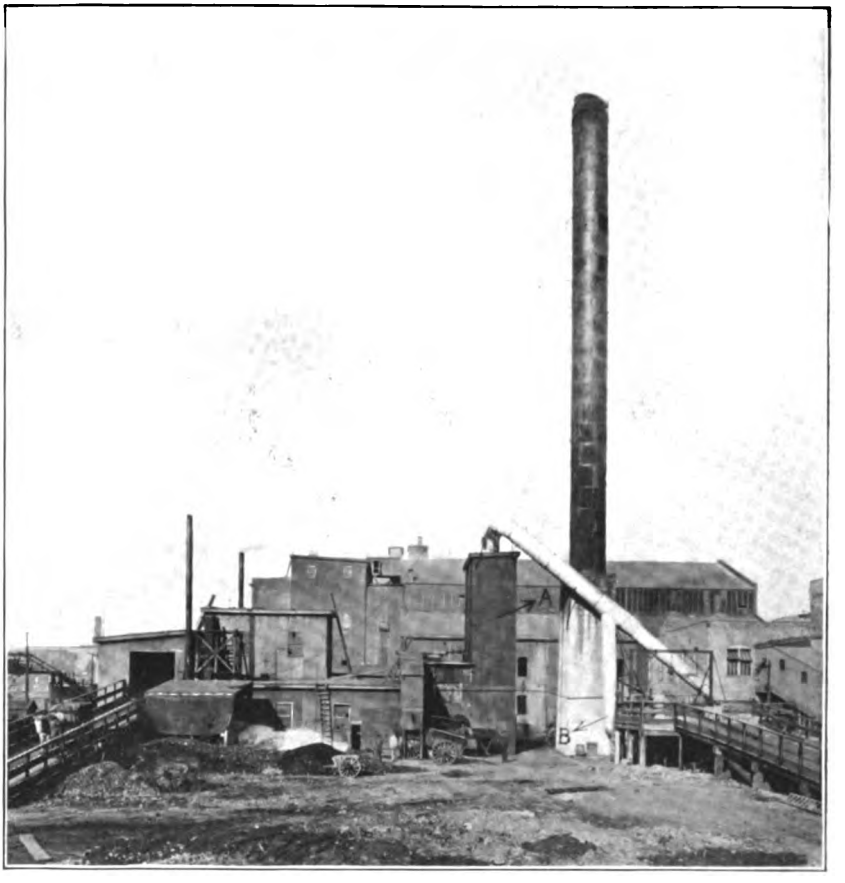

VIEW OF FERTILIZER ODOR-DESTROYING PLANT AT UNION STOCK YARDS.

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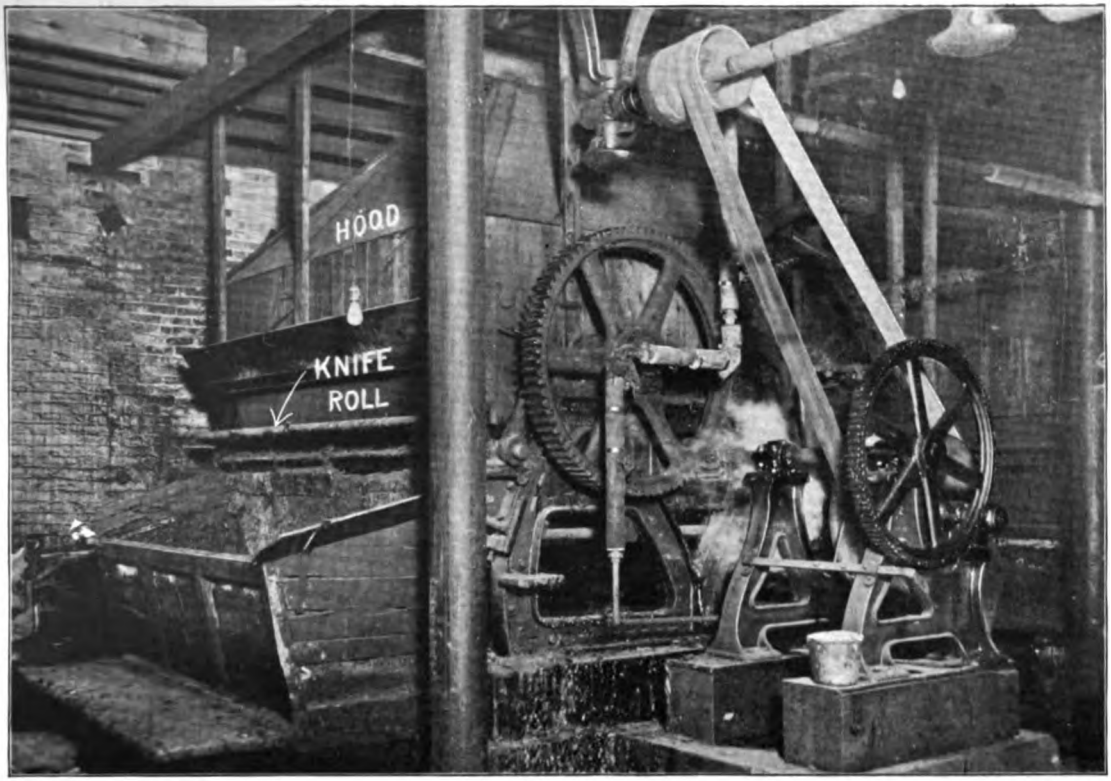

CUT SHOWING HOODING OF STICK ROLL DRYERS AT CHICAGO UNION STOCK YARDS.

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dividing into the two arms of the same, one of which is marked "B" and which enter, one at the left and one at the right, into the furnace, which is fed by cartloads of rubbish. The furnace and stacks were constructed for no other purpose than to destroy the odors driven off by the process of drying. The stack is 160 feet high, and this destructor as it stands represents an outlay of several thousands of dollars. This type of dryer it is hoped will prove successful, and it always seems so when a proper fire and a proper amount of water are used. The advantage to be gained from this type of dryer as viewed from the DEPARTMENT'S standpoint, is this, that the same is only operated during the day time.

Coupled with this improvement is that of an arrangement made to destroy what is known as "stick odors." These odors are caused by the drying upon long exposed revolving heated rolls, as shown in the cut. The sludge is what is left after the greatest portion of the tank water, left from the rendering process, is evaporated.

As the rolls are turned outward they pick up the sludge and as the rolls are heated by steam applied upon the inside the sludge by the time it gets over to the knife which is indicated in the cut, becomes hard and brittle and is received into the box shown at the left of the cut. There is never any difficulty in determining these odors, or those from a fertilizer either, at a distance of four or five miles from their source whence the same escaped.

These two odors are the worst forms of odor nuisance and are difficult to keep under control, and when not under control are of great magnitude. Under this BUREAU'S orders the rolls of the various plants were hooded as shown in the accompanying cut, the odors and gases from the "stick" roll dryer are conducted to a large thirty-foot condenser shown in the view taken of the same as it is located at the side of the building. The falling column of water

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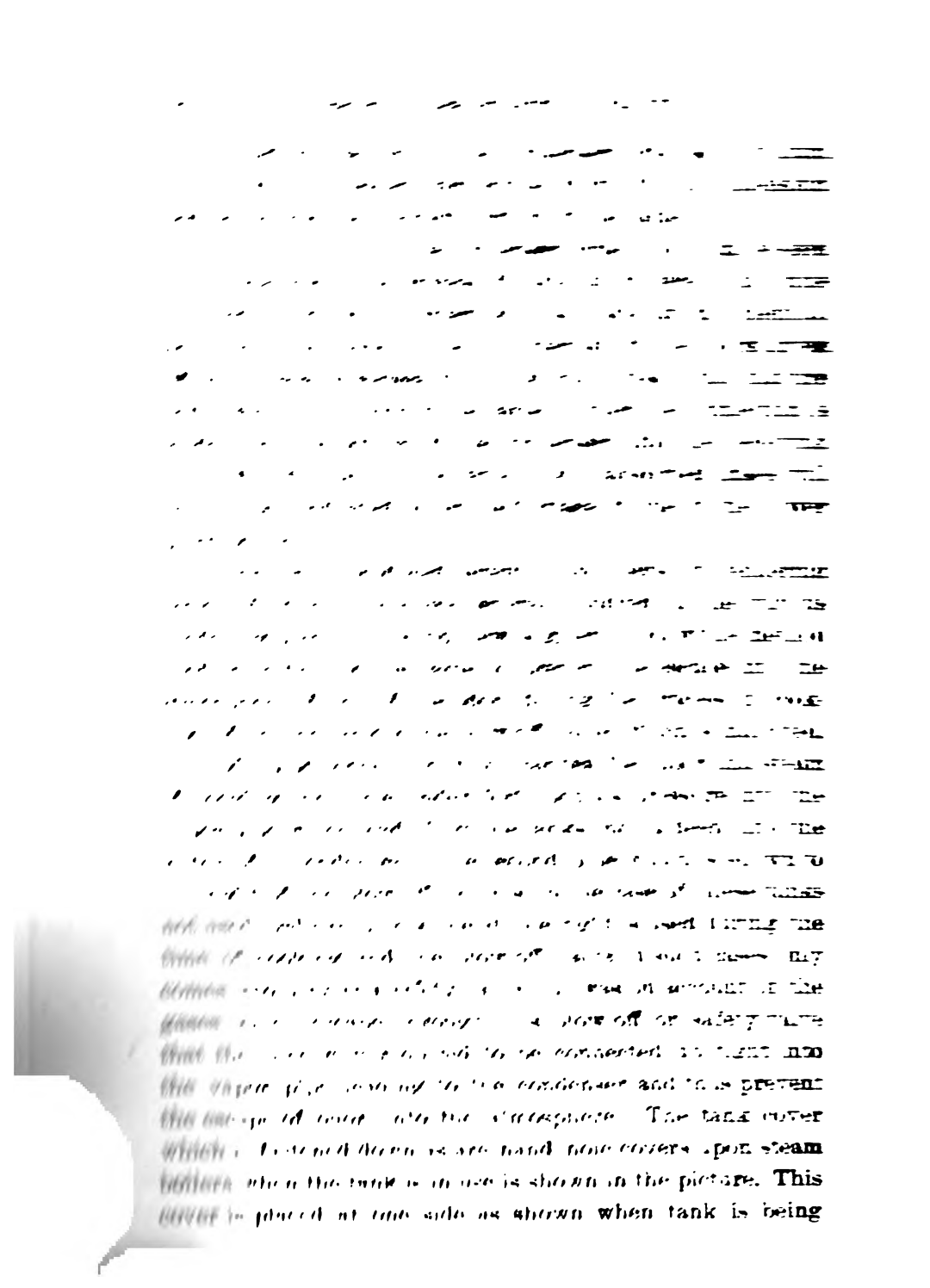

boiler when the tank is in use is shown in the picture. This
cover is placed at one side as shown when tank is being

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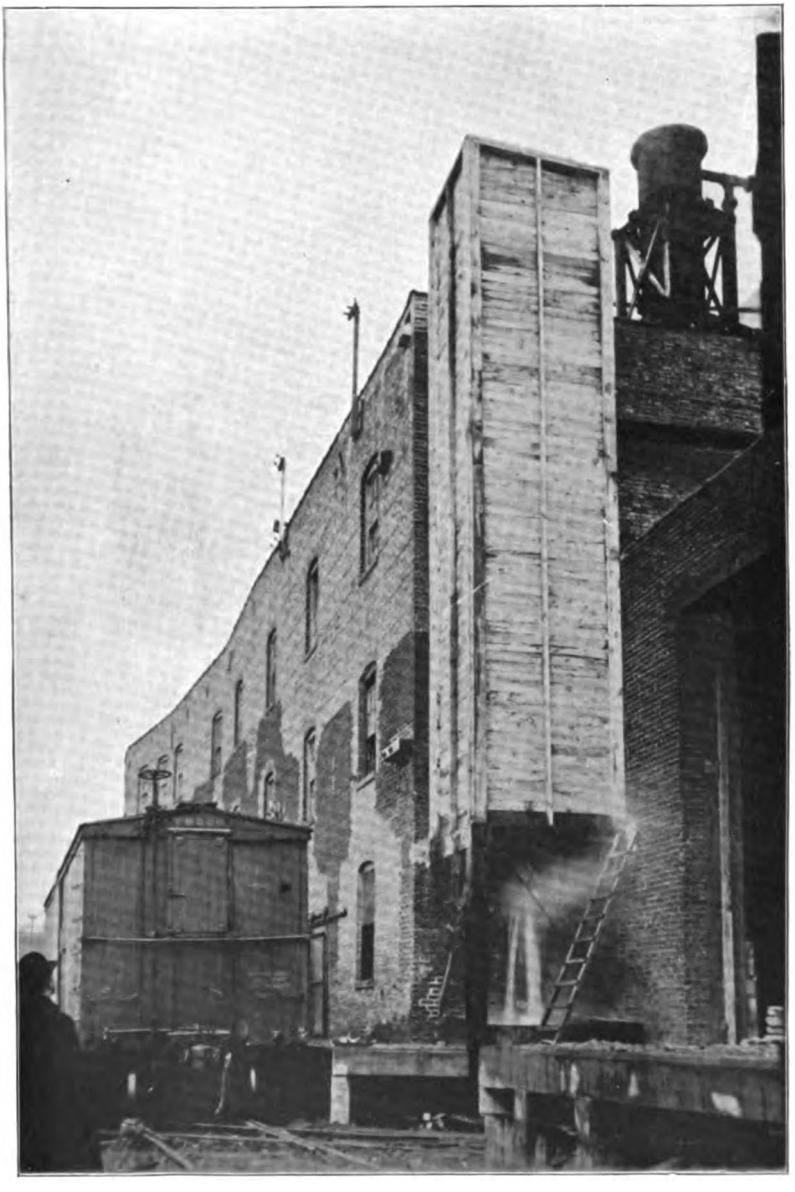

CUT SHOWING 30-INCH CONDENSER BOX FOR CONDENSING "STICK" PLANT ODORS.

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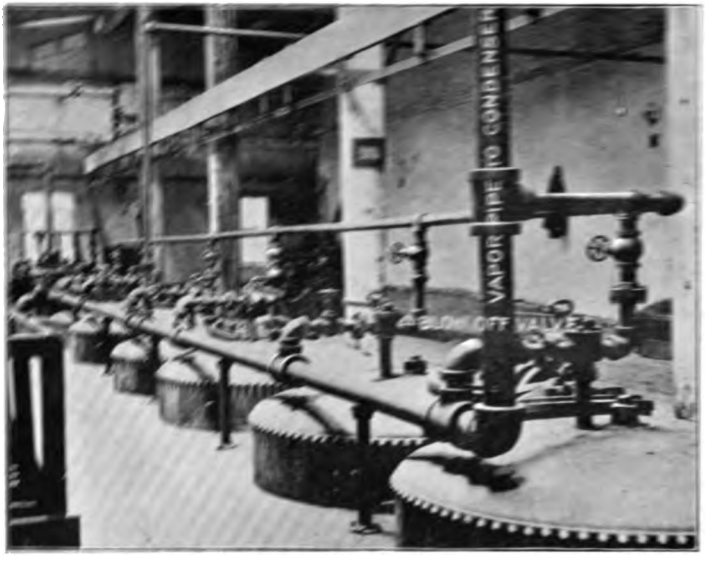
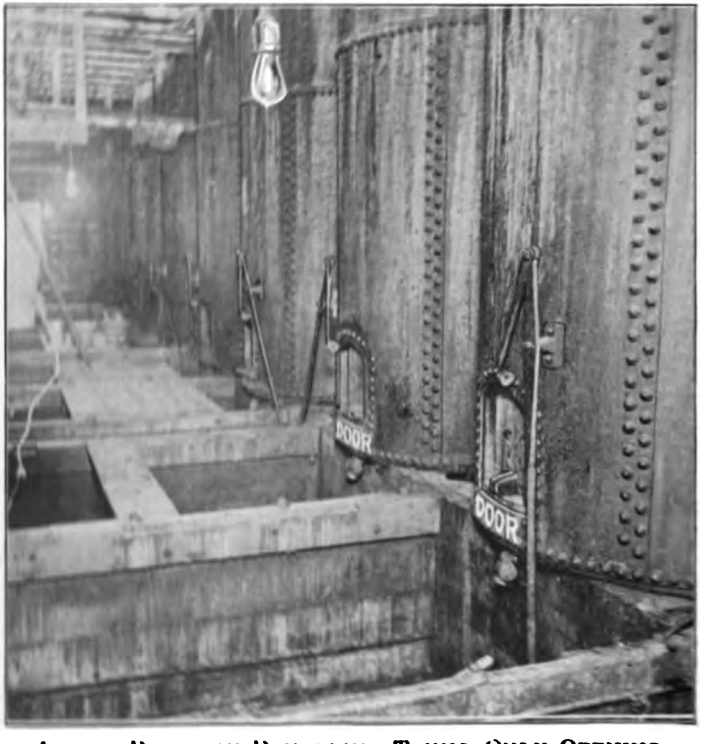


CONNECTIONS OF IMPROVED RENDERING TANKS FOR PREVENTING THE ODORS ESCAPING.



LOWER PARTS OF RENDERING TANKS, ONLY OPENING BEING THE DOOR.

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filled. The second view shows the bottom of the tank upon the floor below. The only opening here is at the point marked "door" and this door is only opened after the process of cooking is completed and after the grease has been blown off to allow of the drying out of the tankage into the open wooden vats shown at the left of the tanks.

These views are reproduced with the idea of showing the excellent supervision under which such processes are conducted.

In order that the condenser into which these vapors pass will not be neglected, a vapor pipe running from the top of the condenser which receives the uncondensed gases is carried and entered into a furnace beneath the boilers of the power plant, and in order also that a small quantity of water may not be depended upon which would become very highly heated and offensive if the same were permitted, a self-recording thermometer which makes its record in red ink, upon a printed face dial, has been found during the past year to indicate to the DEPARTMENT any neglect or failure to provide sufficient quantities of water for condensing purposes. These thermometers will occasionally need regulation as does a clock. Upon investigations repeatedly made of the same they have been found to be registering temperatures accurately enough for all practical purposes.

The Secretary of the Board of Examiners of Plumbers gives the following summary of the work performed by the Board for the year ending December 31, 1906:

Total number master plumbers examined	106
Total number master plumbers passed	55
Total number master plumbers rejected	51
Total number journeyman plumbers examined	528
Total number journeyman plumbers passed	480
Total number journeyman plumbers rejected	48

Suits recommended for violations of Sections 1604, 1605 and 1610 of Revised Municipal Code, passed March 20, 1905:

Number of suits recommended	10
Number tried and fines imposed	7

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CHICAGO'S FREE PUBLIC BATHS.

By E. R. Pritchard, Secretary of the Department.

The City of Chicago now has $176 651 invested in ten Free Municipal Baths, that, during the year 1906 gave a grand total of 825 315 baths to people who are not provided at their homes with proper and adequate facilities for enjoying the luxury of personal cleanliness.

These institutions, it is conceded, are indispensable adjuncts of municipal hygiene and are ranked among the most important of the city's public utilities.

As has been explained in previous reports the Free Public Baths have not been established as places of diversion. They are wholly utilitarian, tending, of course, to promote the habits of personal cleanliness among those who are not otherwise enabled to observe the fundamental rules of health and sanitation.

It is hardly necessary to say that the Free Public Baths of Chicago are growing in public favor all the time. This is abundantly demonstrated by the increased attendance and by the constant demand for additional baths in those sections of the city not already provided for.

During the summer months there are demands upon all the baths far beyond their capacity. The beneficiaries are of all ages, from infants in arms to octogenarians. School children and workingmen predominate. All baths are absolutely free to the public. At each of the baths two days of each week are set apart for the exclusive benefit of women and girls.

The Carter H. Harrison bath at 192 Mather street, in the Nineteenth Ward, was the first free public bath in the United States, and, so far as is known, the first in the world to be absolutely free, all other public baths prior to the opening of this charging a small fee, ranging from five kreuzers (about two cents) at the Volksbad in Vienna to five cents in the public rain baths of New York City.

An average of twenty minutes is consumed in the time allowed for each batch of bathers. Of this seven to eight minutes are spent under the showers with the water from the sprays in full force. The remainder is allowed for undressing and completing the toilet after the water is

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turned off. By following this program the showers are filled and emptied once during every half hour of the time they are open to the public.

Location, Cost, etc.

Following is given the location of the various Free Public Baths, the cost of each, including ground, equipment, date of opening, etc.:

THIRD WARD—Name, Martin B. Madden; location, 3525 Wentworth avenue; cost of ground, 50x125 feet, $5000.00; building and equipment, $15 361.00; total, $20 361.00; opened April, 1897.

FOURTH WARD—Name, John Wentworth; location, 2839-2841 So. Halsted street; cost of ground, 50x133 feet, $2850.00; building and equipment, $16 208.33; total, $19 050.33; opened December, 1905.

FIFTH WARD—Name, William B. Ogden; location, 3346-3348 Emerald avenue; cost of ground, 48x124.5 feet, $1650.00; building and equipment, $15 623.53; total $17 273.53; opened July, 1906.

FIFTEENTH WARD—Name, Joseph M. Medill, 759-761 Grand avenue; cost of ground, 50x100, $1839.00; building and equipment, $14 518.00; total, $16 357.00; opened September, 1906.

SIXTEENTH WARD—Name, Kosciuzko; location, 103-105 Holt avenue; cost of ground, 50x125, $3350.00; building and equipment, $14 267.00; total, $17 617.00; opened April, 1904.

SEVENTEENTH WARD—Name, Theodore T. Gurney; location, 247-249 West Chicago avenue; cost of ground, 40x121 feet, $5000.00; building and equipment, $16 085.31; total, $21 085.41; opened May, 1906.

EIGHTEENTH WARD—Name, Robert A. Waller; location, 80 South Peoria street; cost of ground, 25x125 feet, $3750.00; building and equipment, $10 106.60; total, $13 856.60; opened February, 1901.

NINETEENTH WARD—Name, Carter H. Harrison; location, 192 Mather street; cost of ground, 25x118 feet, $3750.00; building and equipment, $16 899.40; total, $20 649.40; opened January, 1894.

TWENTY-SECOND WARD—Name, DeWitt C. Cregier; location, 193-195 Gault court; cost of ground, 50x100 feet, $3750.50; building and equipment, $14 318.83; total, $18 068.83; opened October, 1905.

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TWENTY-NINTH WARD—Name, William Mavor; location, 4647 Gross avenue; cost of ground, 50x100 feet, $1986.51; building and equipment, $5340.00; total, $7326.51; opened May, 1900.

In addition to the above, the city also has provided free bathing facilities at two of the pumping stations. These are the Fourteenth and Twenty-second street Stations, where showers have been installed and the waste water from the huge condensers is utilized in furnishing free baths to the working men in those vicinities.

Baths Given at Each of the Municipal Baths, During the Years 1906 and 1905, by Sexes.

		1906.	1905.
CARTER H. HARRISON BATH:	Men	67 375	84 767
	Boys	32 061	45 793
	Women	15 848	16 917
	Girls	16 607	17 259
	Total	131 891	164 736
MARTIN B. MADDEN BATH:	Men	59 532	63 975
	Boys	32 673	37 600
	Women	7 294	6 525
	Girls	13 040	13 108
	Total	112 539	121 208
WILLIAM MAVOR BATH:	Men	17 957	29 768
	Boys	9 151	27 265
	Women	4 596	11 751
	Girls	3 394	11 890
	Total	35 098	80 674
FOURTEENTH STREET PUMPING STATION:	Men	35 761	28 482
	Boys	11 272	9 468
	Total	47 033	37 950
TWENTY-SECOND STREET PUMPING STATION:	Men	21 432	22 155
	Boys	10 706	11 796
	Total	32 138	33 951
ROBERT A. WALLER BATH:	Men	53 233	58 209
	Boys	27 730	27 275
	Women	6 072	5 810
	Girls	11 085	11 336
	Total	98 120	102 630

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KOSCIUSZKO BATH:	Men	38 591	49 400
	Boys	36 571	41 111
	Women	10 086	9 771
	Girls	27 353	31 943
	Total	112 601	132 225
D. C. CREGIER BATH:	Men	22 095	2 437
	Boys	30 337	8 968
	Women	4 103	742
	Girls	14 299	3 803
	Total	70 834	15 950
JOHN WENTWORTH BATH:	Men	35 918	1 573
	Boys	25 304	1 441
	Women	7 049	367
	Girls	8 876	366
	Total	77 147	3 747
THEODORE T. GURNEY BATH:	Men	17 842	.....
	Boys	17 583	.....
	Women	3 197	.....
	Girls	10 428	.....
	Total	49 050	.....
JOSEPH MEDILL BATH:	Men	4 339	.....
	Boys	6 707	.....
	Women	1 080	.....
	Girls	3 747	.....
	Total	15 873	.....
WILLIAM B. OGDEN BATH:	Men	16 355	.....
	Boys	15 149	.....
	Women	5 627	.....
	Girls	5 860	.....
	Total	42 991	.....
Totals—All Baths:	Men	390 430	340 766
	Boys	255 244	210 717
	Women	64 952	51 883
	Girls	114 689	89 705
	Males	645 674	551 483
	Females	179 641	141 588
	Grand Totals	825 315	693 071

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Cost of Administration.

The cost of administration for the years 1904 and 1905 was, approximately, 4 cents for each bath given. For the year 1906 this cost was increased to five and two tenths cents.

This increase of cost per bath may be explained by the fact that two of the baths were opened late in the year and yet the cost of equipment was practically the same as though they had been operated for the entire year. Then, too, the opening of free bathing beaches at various points along the lake shore, greatly reduced the attendance at the Free Public Baths during July and August. This, together with the changing of hours during which the baths are kept open, from 9 A. M. to 5:30 P. M., to from 12 M. to 9:30 P. M., accounts for the lack of proportionate increase in attendance during the year, taking into consideration the increased facilities, and naturally accounts for the increased cost per bath given.

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REPORT OF THE CITY PHYSICIAN FOR 1906.

JAMES F. TODD, M. D.

FOR many years previous to the revision and adoption of the Municipal Code, which went into effect in 1905, the ordinance defining the duties of the City Physician was misleading and absurd. The work was performed on the suggestion of varying requirements and under obvious embarrassments. The revised ordinance defines the duties of the office as follows:

1. To visit police stations, examine and make provision for the care of all persons found to be sick, injured or insane.
2. To examine all cases of alleged indecent assaults upon females.
3. To examine all city employes, sick or injured.
4. To visit and examine all cases of injury or illness alleged to have resulted from defective streets, alleys, sidewalks or bridges, or from any causes which might render the city liable for damages.
5. To examine the physical condition of dependent and delinquent children.
6. To visit each month, the House of Correction, the Chicago City Infants' Hospital, the Juvenile Home for Children, the House of the Good Shepherd, and the Chicago Refuge for Girls.
7. To transmit to the Mayor and City Council on the first of each month a report of all services performed during the preceding month.

These duties are mandatory, but conferred no authority upon the City Physician or his assistant to order any change of management in any of the institutions mentioned.

I am gratified that I have no criticism to report of any of these institutions. Their reports, submitted severally, indicate advanced views of the management of such interests, and intelligent application of the best resources obtainable.

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The report of Dr. Chas. E. Sceleth, resident physician of the House of Correction, whose efficiency is generally recognized, will be of interest to the medical profession and the laity as well. The management of that great institution by Superintendent Lynch is creditable to him, both from a humanitarian and business point of view. The premises are clean, the food abundant, well prepared and nutritious, and so far as I have been able to observe the treatment of the inmates is judicious and humane.

The Chicago City Infants' Hospital has sustained a serious loss in the recent death of its Superintendent, Sister Julia, who had won a national reputation in the management of children's hospitals. In the crowning achievement of a great success in her efforts in behalf of a noble charity, she gave her life and her benediction. It is due to her memory that the hospital with which she was last identified be developed and sustained for the far-reaching purposes that she had in view.

The following statement of services during the past year shows a marked increase over any previous year, due, no doubt, very largely to the requirements of the revised ordinance, and a better knowledge, generally, of its provisions:

Visits and Inspections Made in 1906.

To hospitals and city institutions	90
To sick and injured city employes	114
Written reports to city departments and bureaus	380
Written reports to judges and magistrates	403
Medical witnesses (days)	32
Advised commitments to detention hospital	356
Found not insane after examinations	148
Alcoholism	87
Feeble-minded and epileptics given in care of friends	34
Referred to County Agent and County Hospital	24
Injury and sick calls at police stations	39
City employes examined in office (dressings)	228
Suspected insanity cases examined at police stations	649
Examinations of alleged indecent assault upon females	21

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Number remaining January 1, 1906.	Number admitted.	Number discharged.	Number adopted.	Number other asylum.	Number deaths.	Number remaining January 1, 1907.	DEATHS.							
							Total.	Male.	Female.	Between 12 and 24 months.	Under 6 months.	Between 24 and 36 months.	Between 6 and 12 months.	Between 36 and 48 months.	Between 48 and 60 months.
239	832	325	78	17	330	321	330	.....	.....	12	273	8	30	4	3

Cause of Death.	Total.	Male.	Female.
Acute bronchitis	4	4	...
Acute bowel infection and malnutrition	1	....	1
Acute bronchitis and malnutrition	3	1	2
Acute bronchitis and syphilis	1	1	....
Acute enteritis and syphilis	1	1	....
Acute gastritis and malnutrition	9	6	3
Acute inanition	12	6	6
Acute nephritis	1	1	....
Acute nephritis, malnutrition and oedema, acute bronchitis and general infection	2	1	1
Bronchitis	8	7	1
Bronchitis and gastritis	1	1	....
Bronchitis and marasmus	2	1	1
Bronchitis and rickets	1	1	....
Broncho-pneumonia	9	6	3
Broncho-pneumonia and malnutrition	1	1	....
Cardiac degen. and membrane diphtheria	1	....	1
Chronic colitis and syphilis	1	1	....
Chronic diarrhœa and malnutrition (syphilitic)	1	1	....
Cholera infantum	13	8	5
Cong. heart disease and pulmonary stenosis	1	....	1
Congenital syphilis	2	1	1
Convulsions and acute indigestion	1	....	1
Convulsions and cerebral palsy	1	....	1
Convulsions and gastro enteritis	2	....	2
Diarrhœa	1	....	1
Diphtheria	2	1	1
Enter. colitis	1	1	....
Enteritis and convulsions	2	2	....
Gangrenous stomatitis and diphtheria	2	2	....
Gastritis	1	1	....
Gastro-enteritis	113	56	57
Gastro-enteritis and bronchitis	2	....	2
Gastro-enteritis and malnutrition	2	2	....
Gastro-enteritis and marasmus	2	1	1
Gastro-enteritis and thrush	1	1	....
Hereditary syphilis	4	3	1
Hereditary syphilis and gastro-enteritis	2	1	1
Ileo-colitis	1	1	....
Ileo-colitis and malnutrition	1	....	1
Lobar pneumonia	3	2	1
Marasmus	58	39	19
Marasmus and gastro-enteritis	2	....	2
Marasmus and syphilis	5	3	2
Marasmus and scurvy	1	1	....
Marasmus and tuberculosis	1	1	....
Measles	1	....	1
Measles and diphtheria	2	1	1
Pertussis	1	....	1
Pertussis and measles	1	1	....
Phthisis	1	....	1
Pneumonia	10	6	4
Pneumonia and measles	5	2	3
Prem. birth and gastro-enteritis	3	1	2
Prem. birth and ophthalmia	3	2	1
Pulmonary and gangrene	1	....	1
Pulmonary tuberculosis	1	1	....
Purpura malnutrition	1	1	....
Purulent pericarditis and broncho-pneumonia	1	....	1
Septicemia	1	....	1
Spinal meningitis	1	1	....
Stillbirth	4	3	1
Syphilis cong.	3	....	3
Thrush	1	....	1
Lobar pneumonia	1	....	1
Tuberculosis	1	1	....
Umbilical hemorrhage	1	....	1

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Medical Service — House of Correction: 1906.

CHAS. E. SCHLETH, M. D., RESIDENT PHYSICIAN.

1906	Medical cases.	Surgical cases.	Delirium tremens.	Alcoholism.	Vaccinations.	Revaccinations.	Cell house prisoners.	Deaths.	Coroner's inquests.	In hospital at end of month.	Discharged cured.
January	94	32	52	5	690	33	1947	3	3	32	112
February	78	61	40	5	515	67	1678	2	2	28	97
March	88	22	30	1	544	24	1920	1	1	36	96
April	96	22	48	1	742	49	1801	3	3	33	108
May	72	26	40	30	900	72	1110	2	2	31	119
June	92	36	49	34	807	153	900	1	1	31	107
July	68	19	42	27	600	118	1175	.....	.....	24	122
August	106	26	56	3	639	45	938	3	3	37	95
September	90	25	40	2	602	24	1002	4	4	35	91
October	76	16	49	.....	584	49	958	3	3	29	88
November	74	30	35	1	547	60	1002	2	2	38	83
December	89	44	48	2	712	64	826	5	5	48	100
Totals	1023	359	529	111	7882	758	22612	29	29	452	1220

CHICAGO, ILL., Dec. 31, 1906.

DR. J. F. TODD, *City Physician.*

DEAR SIR—I have the honor to report that I visited the Juvenile Detention Home, 625 Adams street, once each month during the current year. So far as the buildings and sanitation are concerned there is nothing to add to my report of last year. During the coming year it is expected that a new building expressly designed as a Juvenile Detention Home, and located on Polk street near Halsted, will be finished. I have not seen the plans, but hope it will provide greater number of accommodations, more air space per bed, and a suitable playground.

One notable improvement was instituted this year, viz: a school-room conducted by the Board of Education, in the usual manner and usual hours. There has been occasional

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overcrowding, and at one time it reached serious proportions, and was reported by me at the time. There is considerable trouble also with vermin. I hope in the new building these difficulties will be obviated.

The medical report is very favorable. During the year cases of mumps, chickenpox, whooping-cough and diphtheria, developed in some children after admission, having been latent at the time of admission and developing within the usual periods of incubation for the several ailments. Except in the case of diphtheria there was no further spread of the diseases. There were two cases, both mild, following the admission of a latent diphtheria, notwithstanding fumigation and immunizing injections of antitoxin, which, however, apparently greatly modified the severity of the ailments. There was one death, due to cerebro-spinal meningitis, and no subsequent cases.

The Superintendent suggests that there be water closets separate from the wash and bath rooms in both the delinquent and dependent departments; a fumigator for clothes to destroy vermin; a conveyance for taking sick children to the hospital. As there are only three or four cases a month to go to the hospital I should think a separate conveyance for this purpose unnecessary.

During the year 1906 there were received in all 2818 children, all of whom except the few remaining at present have had their cases disposed of through the Juvenile Court.

There were 44 cases of sickness.

Respectfully,

ALFRED LEWY, M. D.
Assistant City Physician.

CHICAGO, ILL., Dec. 31, 1906.

DR. J. F. TODD, *City Physician.*

DEAR SIR—I have the honor to submit herewith annual report of the Chicago Refuge for Girls, 5024 Indiana avenue, to which I made twelve visits during the year. The physical condition of the institution and its inmates appears to be excellent except that some of the babies show the effect of the indoor confinement enforced by the unusual amount of inclement weather lately. About forty feet width has been added to the south yard for its entire length,

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There has been very little sickness, and that mostly of a minor order, 87 cases in all. 1 typhoid, 1 pneumonia, 1 uremia, 1 endocarditis, 2 chorea, 7 syphilis. The others were colds and such minor affairs.

Since March there have been received 208 girls, there being 270 already in the institution in March. At the end of the year 333 remained.

Respectfully,

ALFRED LEWY, M. D.,
Assistant City Physician.

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DEPARTMENT OF HEALTH—FINANCIAL STATEMENT.

Monthly Expenditures on all Accounts and Total Disbursements for the Calendar Year ended December 31, 1906. E. R. PRITCHARD, *Secretary*.

	January.	February.	March.	April.	May.	June.	July.	August.	Sept'mber.	October.	November.	December.	TOTAL.
Commissioner's office	$ 1 011 09	$ 1 043 75	$ 1 030 63	$ 2 730 93	$ 1 399 98	$ 1 262 48	$ 1 600 22	$ 1 438 68	$ 1 474 98	$ 1 474 98	$ 1 474 98	$ 1 474 97	$ 17 417 67
Contagious disease, salaries	2 007 86	2 243 75	2 368 73	5 792 77	3 495 88	2 697 16	2 748 28	2 641 61	2 874 94	2 874 94	2 874 94	2 874 94	35 495 80
Supplies	43 12	1 475 44	819 86	1 242 45	4 058 44	329 80	.....	.....	.....	.....	.....	.....	7 969 11
Vital statistics, salaries	500 00	500 00	500 00	1 799 98	824 98	741 65	908 31	824 98	824 98	824 98	824 98	824 98	9 899 82
Isolation hospital, salaries	882 14	810 53	783 75	1 996 54	1 093 62	1 136 63	1 136 63	986 63	1 026 63	1 061 63	1 061 63	928 97	12 905 33
Supplies	.....	149 91	429 97	104 64	1 078 83	382 23	526 64	658 22	22 40	590 85	329 92	1 185 57	5 459 18
Repairs and renewals	9 39	23 23	24 80	34 59	326 47	227 00	342 79	.....	297 44	135 24	127 20	230 15	1 778 30
Ambulance service, salaries	293 75	293 75	293 75	685 41	391 66	391 66	391 66	391 66	391 66	391 66	391 66	391 66	4 699 94
Repairs and renewals	.....	66 01	980 63	448 70	21 46	113 25	166 25	.....	.....	118 95	45 35	267 85	2 228 45
Live stock, replacement and keep	.....	371 97	373 45	2 245 97	1 039 17	486 78	478 92	.....	258 50	935 41	189 71	1 359 37	7 736 25
Public baths, salaries	1 303 75	1 303 75	1 390 43	4 105 11	2 124 97	2 322 47	2 353 46	2 566 11	2 710 35	2 733 30	2 733 30	2 733 30	28 380 30
Repairs and renewals	23 71	259 61	481 30	289 76	271 80	165 46	1 543 58	2 00	452 86	972 28	295 67	366 35	5 124 40
Supplies	.....	592 78	636 66	674 93	626 47	1 150 87	257 74	37 20	1 316 12	1 423 31	680 19	2 582 25	9 978 72
Ice, milk, meat and food inspection	1 489 44	1 738 39	1 917 69	4 584 33	3 232 68	3 246 40	3 500 69	3 946 13	3 929 06	3 906 89	3 999 89	3 999 89	39 491 48
Drugs and appliances	.....	107 80	384 34	6 03	64 49	35 14	212 46	.....	66 41	193 57	121 47	362 93	1 554 64
Printing and stationary	.....	547 70	539 33	653 82	341 97	259 72	1 022 18	83	34 30	886 88	3 745 29	1 450 96	9 482 98
Other supplies	425 58	140 00	445 01	352 55	331 21	1 563 18	656 71	197 30	14 95	698 80	645 61	2 258 66	7 906 02
Transportation	.....	333 25	225 80	243 65	374 10	230 05	324 40	.....	.....	903 00	298 85	595 60	3 528 70
Rent, night soil plant	.....	.....	.....	.....	.....	.....	.....	.....	1 125 00	125 00	125 00	125 00	1 500 00
Repairs and renewals	146 25	600 51	458 64	532 99	882 78	941 73	314 30	.....	31 06	3 009 45	351 44	475 01	7 003 28
Sanitary inspection	2 268 75	2 268 75	2 268 75	8 356 54	4 178 38	3 955 63	4 555 51	4 370 68	4 448 96	4 674 43	4 960 04	4 968 94	51 289 36
Board of examining plumbers	281 25	281 25	281 25	656 25	375 00	375 00	375 00	375 00	375 00	375 00	375 00	375 00	4 500 00
Laboratory, salaries	680 50	720 00	727 26	2 024 43	1 233 36	1 062 70	1 136 32	1 126 65	1 174 15	1 325 85	1 243 31	1 461 09	13 915 62
Supplies	11 09	202 57	88 76	40 41	26 32	62 76	82 51	22 58	9 45	162 07	21 63	200 51	754 20
Rent	.....	1 125 00	.....	750 00	.....	375 00	750 00	.....	375 00	375 00	375 00	375 00	4 500 00
Repairs and renewals	.....	125 40	67 38	689 44	205 31	407 00	26 05	6 85	97 31	150 55	47 37	520 44	3 083 98
Emergency	56 25	72 30	200 38	232 50	239 52	2 967 57	4 161 26	851 65	1 869 99	6 107 89	3 495 01	10 601 45	30 855 77
Maintenance, night soil reduction plant	.....	.....	.....	.....	.....	.....	.....	.....	.....	79 03	397 08	695 00	1 171 11
Total	$ 11 433 92	$ 17 397 60	$ 17 718 55	$ 41 273 74	$ 28 233 85	$ 26 889 32	$ 29 571 87	$ 20 444 76	$ 25 201 50	$ 36 510 94	$ 31 231 52	$ 43 705 84	$ 329 613 41

NOTE—The Comptroller was paid the sum of $ 3 500 96, being for receipts, as follows:

Receipts from certified copies record of death	$ 1 551 50
Receipts from plumbers' certificates issued	746 00
Receipts from sale of condemned calves	1 127 46
Receipts from assistant undertakers' certificates	15 00
Receipts from returned carboys	61 00
Total	$ 3 500 96

Extension of power plant, Isolation Hospital	$ 7 952 52
Site for public bath, Thirtieth ward	2 268 85
Tenth ward	5 083 62
Ninth ward	3 514 52
Purchase of night soil reduction plants	38 945 68
Equiptment of night soil reduction plants	33 50
Completion of public bath in Fifth ward	4 149 36
Fourteenth ward	8 047 63
Seventeenth ward	6 249 22
Purchase of ground for Martin B. Madden bath	5 000 00
Fourth ward bath	870 23
Twenty-second ward bath	374 00
Total	$ 82 489 13
Grand total	$ 412 102 54

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REVENUE DERIVED FROM LICENSES ISSUED IN 1906 FOR ESTABLISHMENT OR MAINTENANCE OF INDUSTRIES OR BUSINESS THAT COME UNDER SUPERVISION OF THE DEPARTMENT OF HEALTH.

Hospitals, 64 at $100	$ 6 400.00
Undertaking, 425 at $10	4 250.00
Cigarettes, 706 at $100	70 600.00
Ice, Licenses, 660 at $10.00	6 600.00
Milk—Stores, $24 735; Peddlers, $27 245	51 980.00
Building plans, approved	32 264.00
Bakers, 1095 at $5	5 475.00
Butchers, 3361 at $15	50 415.00
Scavengers, private, 127 at $5	635.00
Scavengers, night, 7 at $50	350.00
Packers and Renderers, 35 at $300	10 500.00
Rendering tanks, 264 at $10	2 640.00
Restaurants, 1430 at $15	21 450.00
Workshops, 1226 at $2	2 452.00
Soap Factories, 8 at $300	2 400.00
Tanneries, 23 at $50	1 150.00
Junk dealers, 167 at $50	8 350.00
License fees paid to County Clerk	$277 911.00
Other fees paid to Comptroller	3 500.96
Total	$281 411.96

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BUREAU OF VITAL STATISTICS

M. O. HECKARD, M. D.
Registrar of Vital Statistics

MORTALITY STATISTICS FOR THE YEAR 1906

J. J. DILLON,
Recorder of Deaths

CHRONOLOGICAL SUMMARY OF THE PRINCIPAL CAUSES OF MORTALITY IN THE CITY OF CHICAGO FOR FIFTY YEARS

C. ST. CLAIR DRAKE, M. D.
Assistant Registrar of Vital Statistics

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DEATHS AND REPORTED CAUSES OF DEATH: 1906.

	CAUSES OF DEATH.	TOTALS.	SEX.		COLOR.			NATIVITY.				SOCIAL STATUS.				
			Male.	Female.	White.	Colored.	Other.	Chicago.	U. S. Elsewhere.	Foreign.	Unknown.	Single.	Married.	Widowed.	Divorced.	Unknown.
a	**Total Deaths, All Causes**	29048	16852	12196	28123	903	22	10999	6348	11255	456	14917	9423	4096	150	462
b	**from Diseases**	26576	14915	11661	25720	836	20	10535	5773	10090	308	13870	8483	3776	117	330
c	**Violence**	2230	1820	410	2170	58	2	396	591	1100	143	960	909	302	30	129
d	**Ill-defined Causes.**	242	117	125	233	9	....	58	44	135	5	87	31	118	3	3
	DEATHS FROM DISEASE:															
1	Cerebro-spinal fever	6	2	4	5	1	....	4	....	2	....	5	1	....	....	....
2	Chickenpox	4	2	2	4	....	....	4	....	....	....	4	....	....	....	....
3	Diphtheria	547	313	234	543	4	....	437	79	27	4	535	10	2	....	....
4	Influenza	119	57	62	115	3	1	32	29	56	2	38	45	33	....	3
5	Measles	128	65	63	127	1	....	96	14	16	2	128	....	....	....	....
6	Mumps	4	3	1	4	....	....	2	1	1	....	4	....	....	....	....
7	Scarlet fever	493	249	244	493	....	....	365	78	43	7	483	9	....	....	1
8	Smallpox	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9	Typhoid fever	370	207	163	355	14	1	113	98	155	4	227	128	12	....	3
10	Whooping cough	167	76	91	160	7	....	139	18	9	1	167	....	....	....	....
	Totals	1838	974	864	1806	30	2	1192	317	309	20	1591	193	47	....	7
11	Diarrhea, under 2 y'rs of age	514	270	244	507	7	....	486	19	5	4	514	....	....	....	....
12	over 2 years of age	50	32	18	49	1	....	22	12	16	....	34	7	9	....	....
13	Dysentery, under 2 yr's of age	26	15	11	26	....	....	23	1	1	1	26	....	....	....	....
14	over 2 years of age	75	41	34	74	1	....	5	20	50	....	23	31	19	....	2
15	Enteritis, under 2 y'rs of age	627	362	265	621	6	....	575	36	13	3	627	....	....	....	....
16	over 2 years of age	121	49	72	120	1	....	34	27	58	2	44	40	36	....	1
17	Gastro-Enteritis, under 2 y'rs	1095	622	473	1086	9	....	1013	59	16	7	1095	....	....	....	....
18	over 2 years	209	100	109	203	6	....	90	31	86	2	111	48	47	....	3
	Totals	2717	1491	1226	2686	31	....	2248	205	245	19	2474	126	111	....	6
19	Pneumonia, lobar	906	610	296	873	32	1	225	209	455	17	374	374	137	3	16
20	broncho	980	533	447	950	30	....	623	111	238	8	734	138	97	2	9
21	other and unspecified	2161	1258	903	2069	90	2	813	467	849	32	1106	666	357	3	29
	Totals	4047	2401	1646	3892	152	3	1661	787	1542	57	2214	1178	591	10	54
22	Tuberculosis, pulmonary	3224	2027	1197	3027	188	9	785	923	1456	60	1505	1337	311	17	54
23	abdominal	130	57	73	116	14	....	53	30	47	....	75	44	10	1	....
24	articular	16	7	9	15	1	....	9	3	4	....	8	5	3	....	....
25	cutaneous	4	4	....	3	1	....	....	4	....	....	1	3	....	....	....
26	general	213	130	83	197	16	....	85	58	67	3	130	60	16	4	3
27	glandular	16	8	8	15	1	....	4	4	8	....	8	5	3	....	....
28	laryngeal	20	15	5	20	....	....	....	2	18	....	2	16	2	....	....
29	meningeal	163	87	76	150	13	....	112	30	19	2	150	11	1	....	1
30	other forms	51	26	25	50	1	....	14	15	21	1	28	19	4	....	....
	Totals	3837	2361	1476	3593	235	9	1062	1069	1640	66	1907	1500	350	22	58

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
a	6114	2679	891	1270	2746	3071	3441	3124	4744	966	2	2566	2217	2463	3774	2557	1947	2313	2487	2327	2333	2386	2678	a
b	5999	2576	830	1064	2380	2664	3037	2856	4441	839	....	2363	2041	2292	2584	2346	1753	2083	2250	2110	2119	2191	2444	b
c	64	92	68	206	466	403	401	267	229	32	2	181	156	137	170	197	184	206	219	202	187	177	212	c
d	51	11	3	....	....	4	3	1	74	95	....	22	20	34	20	14	10	22	18	15	27	18	22	d
1	2	2	....	1	....	....	....	1	....	....	....	.....	....	....	2	1	1	1	1	....	....	....	....	1
2	3	1	....	....	....	....	....	....	....	....	....	.....	....	1	....	....	....	1	1	....	....	....	1	2
3	26	306	163	28	13	2	4	2	1	....	....	53	38	44	38	33	24	38	22	31	56	80	90	3
4	15	8	2	6	4	8	12	11	40	13	....	24	10	12	27	10	2	2	1	....	3	8	20	4
5	26	84	15	3	....	....	....	....	....	....	....	6	6	7	16	33	19	9	4	5	3	8	12	5
6	2	1	....	....	1	....	....	....	....	....	....	1	....	....	....	2	1	....	....	....	....	....	....	6
7	24	233	173	48	8	5	1	1	....	....	....	27	33	44	56	61	58	38	24	24	26	51	51	7
8	....	..	....	....	....	....	....	....	....	....	....	.....	....	....	....	....	....	....	....	....	....	....	....	8
9	3	16	23	79	99	80	35	23	12	....	....	27	19	28	34	29	29	20	29	49	37	39	30	9
10	90	69	7	....	....	1	....	....	....	....	....	2	5	9	14	19	11	14	16	30	13	18	16	10
	191	722	383	165	125	96	53	38	53	13	....	140	111	145	187	186	144	124	98	139	138	204	220	
11	421	98	....	....	....	....	....	....	....	....	....	3	....	7	7	7	19	127	174	122	37	8	3	11
12	....	19	2	3	1	1	1	7	13	3	....	.....	1	1	4	2	1	15	17	4	1	3	1	12
13	23	3	....	....	....	....	....	....	....	....	....	1	....	2	....	1	....	6	5	4	7	....	....	13
14	....	1	2	....	2	8	9	18	28	7	....	5	....	5	1	1	1	12	17	16	5	6	6	14
15	525	103	....	....	....	....	....	....	....	....	....	43	30	32	32	35	26	70	135	106	68	20	30	15
16	....	27	5	2	9	5	7	8	45	13	....	5	7	7	16	10	3	14	13	12	15	11	8	16
17	926	169	....	....	....	....	....	....	....	....	....	44	68	53	59	52	50	155	210	175	108	55	66	17
18	....	75	12	8	19	12	8	16	41	18	....	12	10	12	7	16	13	14	37	31	24	20	13	18
	1895	489	21	13	31	26	25	49	127	41	....	113	116	119	126	124	113	413	606	470	265	123	127	
19	70	92	16	21	95	125	165	136	165	21	....	99	99	105	122	101	52	32	27	34	46	85	94	19
20	388	275	36	7	21	25	33	43	132	20	....	104	107	91	131	106	61	31	47	41	63	75	123	20
21	422	310	47	67	104	196	255	255	415	90	....	271	207	225	286	266	133	88	55	76	131	190	233	21
	880	677	99	95	220	346	453	434	712	131	....	474	413	421	549	473	246	151	129	151	240	350	450	
22	45	45	13	233	887	832	644	326	200	9	....	302	239	304	335	296	215	254	248	252	261	254	264	22
23	7	16	7	17	18	17	28	11	9	....	....	10	10	10	8	15	11	9	8	14	14	12	9	23
24	....	2	2	4	1	1	3	3	....	....	....	.....	....	....	1	2	1	4	3	2	1	1	1	24
25	....	....	....	....	....	1	....	3	....	....	....	.....	....	....	....	....	....	....	4	....	....	....	....	25
26	10	18	6	34	69	45	16	10	5	....	....	16	11	17	30	28	22	25	23	13	11	8	9	26
27	3	1	....	1	....	4	2	3	2	....	....	.....	1	....	4	2	2	2	....	1	2	....	2	27
28	....	....	....	....	2	2	8	6	2	....	....	.....	2	4	3	2	2	2	....	2	1	1	1	28
29	33	62	27	18	10	8	2	1	2	....	....	13	15	17	23	19	15	11	11	7	12	7	13	29
30	4	5	....	6	9	9	8	4	6	....	....	7	3	4	5	9	2	2	8	2	3	4	2	30
	102	149	55	313	996	909	711	367	226	9	....	348	281	356	409	373	270	309	305	293	305	287	301	

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

CAUSES OF DEATH.	TOTALS.	SEX.		COLOR.			NATIVITY.				SOCIAL STATUS.				
		Male.	Female.	White.	Colored.	Other.	Chicago.	U. S. Elsewhere.	Foreign.	Unknown.	Single.	Married.	Widowed.	Divorced.	Unknown.
Deaths from Disease—Cont'd.															
31 Cancer of breast	90	.....	90	87	3	....	5	32	53	....	13	51	24	....	2
32 uterus	189	.....	189	186	3	....	9	75	104	1	17	112	54	5	1
33 other female genital organs	12	.....	12	12	....	....	....	4	8	....	3	5	4	....	....
34 mouth	25	23	2	25	....	....	1	6	16	2	3	15	7	....	....
35 stomach	480	289	191	474	5	1	12	93	369	6	51	295	124	3	7
36 liver	136	59	77	135	1	....	4	43	89	....	8	83	41	1	3
37 intestines	86	36	50	86	....	....	1	39	45	1	13	46	23	....	4
38 rectum	40	22	18	40	....	....	3	13	23	1	5	29	6	....	....
39 male genitals	22	22	.....	22	....	....	....	9	13	....	1	16	5	....	....
40 other parts, unspecified	248	149	99	244	4	....	13	74	157	4	30	142	70	3	3
Totals	1328	600	728	1311	16	1	48	388	877	15	144	794	358	12	20
41 Sarcoma of bone	17	11	6	17	....	....	3	4	10	....	6	8	3	....	....
42 brain	2	.....	2	2	....	....	....	1	1	....	.....	2	....	....	....
43 liver	12	6	6	12	....	....	1	....	11	....	1	8	3	....	....
44 kidney	14	8	6	14	....	....	2	5	7	....	5	8	1	....	....
45 uterus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....
46 other parts or unspecified	57	35	23	56	1	....	11	18	28	....	21	27	7	2	....
Totals	102	60	42	101	1	....	17	28	57	....	33	53	14	2	....
47 Rheumatism, acute	59	30	29	58	1	....	25	12	22	....	31	23	5	....	....
48 chronic	76	40	36	75	1	....	25	19	32	....	34	24	16	1	1
49 Carbuncle	2	1	1	2	....	....	1	1	.....	...	1	1	....	....	....
50 Endocarditis, infectious	10	7	3	10	....	....	2	5	3	....	4	6	....	....	....
51 Erysipelas	84	50	34	84	....	....	30	16	38	....	39	27	16	....	2
52 Malaria	8	4	4	8	....	....	1	5	2	....	5	2	1	....	....
53 Ptomain poisoning (food)	1	1	.....	1	....	....	.....	.....	.....	1	.....	.....	.....	....	1
54 Pyemia	19	9	10	17	2	....	12	3	4	....	13	6	....	....	....
55 Septicemia (not puerperal)	61	37	24	59	2	....	15	15	31	....	22	28	10	....	1
56 puerperal	133	.....	133	132	1	....	33	31	69	....	11	116	3	1	2
57 Syphilis	132	83	49	122	10	....	77	32	23	....	98	28	3	1	2
58 Gonorrhea	10	5	5	10	....	....	4	4	2	....	4	5	1	....	....
59 Rabies	4	4	.....	4	....	....	....	3	1	....	1	3	....	....	....
60 Tetanus	51	40	11	50	1	....	23	14	14	....	37	12	2	....	....
61 Trismus nascentium	20	13	7	20	....	....	20	....	.....	....	20	....	....	....	....
62 Thrush	3	2	1	3	....	....	3	....	.....	....	3	....	....	....	....
63 Other contagious, infectious or parasitic diseases	4	2	2	4	....	....	....	1	3	....	.....	4	....	....	....
Totals	677	328	349	659	18	....	271	161	244	1	323	295	57	3	9
64 Anemia, pernicious	88	44	44	87	1	....	16	34	38	....	23	54	9	....	2
65 Leukemia	19	13	6	19	....	....	4	7	8	....	8	8	3	....	....
66 Scurvy	2	.....	2	2	....	....	2	.....	.....	....	2	....	....	....	....
67 Diabetes	173	85	88	167	6	....	23	54	96	....	36	93	42	....	2
68 Hemophilia	5	.....	5	5	....	....	2	1	2	....	4	1	....	....	....
69 Purpura	9	1	8	9	....	....	5	1	3	....	5	4	....	....	....
70 Rickets	43	25	18	37	6	....	31	12	.....	....	43	....	....	....	....
71 Alcoholism	78	72	6	76	2	....	7	18	53	....	27	30	9	....	12
72 Industrial poisoning	3	3	.....	3	....	....	....	....	3	....	.....	3	....	....	....
73 Opium and other drug habits	5	1	4	5	....	....	1	3	1	....	1	2	2	....	....
Totals	435	244	181	410	15	....	91	130	204	....	149	195	65	...	16

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
31	....	....	....	....	2	12	22	38	24	2	....	6	6	6	7	5	7	7	9	8	10	12	7	31
32	....	....	....	....	6	25	46	70	39	3	....	17	17	18	17	21	13	15	16	14	17	12	12	32
33	....	....	....	....	....	....	5	2	5	....	....	1	1	....	....	1	2	2	2	....	1	1	1	33
34	....	....	....	....	....	1	3	3	14	4	....	3	2	4	5	1	....	1	2	....	1	2	4	34
35	....	....	....	1	4	20	24	138	208	15	....	50	35	28	40	42	44	37	45	41	35	34	48	35
36	....	....	....	....	....	9	29	49	45	4	....	14	12	8	12	15	5	9	11	12	13	11	14	36
37	....	....	....	....	3	11	15	31	20	6	....	11	13	2	9	3	10	5	5	7	3	11	7	37
38	....	....	....	....	....	2	9	13	15	1	....	1	3	5	2	3	5	8	3	4	4	2	....	38
39	....	....	....	1	....	1	1	3	12	4	....	....	5	3	1	3	2	....	1	1	1	2	3	39
40	....	....	....	....	4	17	42	73	103	9	....	28	13	17	23	24	12	20	27	22	21	24	17	40
	....	....	....	2	19	98	266	410	485	48	....	131	107	91	116	119	100	104	121	109	106	111	113	
41	....	2	....	....	3	1	1	4	6	....	....	....	1	....	2	1	4	1	2	....	1	2	3	41
42	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	42
43	....	....	....	1	....	....	3	4	3	1	....	....	1	2	....	1	2	3	1	....	....	1	1	43
44	....	1	....	2	2	1	2	3	3	....	....	2	2	1	2	....	....	2	4	1	....	....	....	44
45	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45
46	1	4	1	7	7	11	7	8	11	....	....	5	6	4	3	7	....	5	5	6	7	5	4	46
	1	7	1	10	12	13	14	20	23	1	....	7	10	7	7	9	7	11	12	7	8	8	9	
47	1	4	4	20	8	6	6	4	6	....	....	8	5	8	8	2	3	10	3	3	1	1	7	47
48	....	....	6	14	10	4	3	8	30	1	....	7	9	13	7	9	5	8	5	2	4	4	3	48
49	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	49
50	....	....	1	1	2	3	....	1	1	....	....	....	....	1	1	....	2	4	....	....	1	....	1	50
51	23	4	1	....	3	9	16	10	14	4	....	10	4	11	13	6	9	6	2	5	8	3	7	51
52	1	....	....	1	2	1	....	....	3	....	....	....	1	1	....	1	....	....	2	....	2	....	1	52
53	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	53
54	5	1	1	4	4	1	2	....	1	....	....	2	2	2	5	1	2	....	2	1	1	1	....	54
55	8	2	1	2	9	12	10	9	8	....	....	10	5	7	3	5	5	....	2	7	7	6	4	55
56	....	....	....	8	71	41	13	....	....	....	....	8	9	9	13	14	10	14	13	7	12	14	10	56
57	72	5	1	3	11	15	19	4	2	....	....	14	10	8	11	15	13	7	12	14	12	10	6	57
58	2	....	....	....	2	1	2	3	....	....	....	1	2	2	....	1	....	1	....	....	1	1	1	58
59	....	....	....	....	....	1	1	2	....	....	....	1	2	....	....	....	....	1	....	....	....	....	....	59
60	0	2	6	9	9	5	7	3	1	....	....	2	3	3	4	3	6	13	5	4	3	3	2	60
61	19	....	....	1	....	....	....	....	....	....	....	....	1	2	1	....	....	1	4	5	2	1	3	61
62	3	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	2	....	....	....	62
63	....	....	....	....	1	2	7	....	....	....	....	2	....	....	....	....	....	....	1	....	....	....	1	63
	144	18	21	63	133	101	81	45	66	5	....	65	54	68	66	59	55	65	51	50	54	44	46	
64	1	2	6	4	11	10	18	18	16	2	....	7	7	9	8	8	5	4	9	5	6	8	12	64
65	....	1	....	1	4	4	5	....	4	....	....	1	1	4	1	1	2	1	....	3	1	3	1	65
66	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	66
67	2	2	1	11	10	10	20	43	69	5	....	10	10	12	19	16	12	16	13	19	15	13	18	67
68	1	1	....	2	1	....	....	....	....	....	....	1	1	....	2	....	....	....	....	1	....	....	....	68
69	1	2	....	2	....	2	....	1	1	....	....	2	1	....	....	....	1	1	2	2	....	....	....	69
70	27	15	1	....	....	....	....	....	....	....	....	2	3	4	2	3	9	3	4	5	6	1	1	70
71	....	....	....	....	6	23	25	18	5	1	....	6	2	4	6	6	5	6	7	8	9	8	11	71
72	....	....	....	....	....	....	1	2	....	....	....	1	....	1	....	....	....	....	1	....	....	....	....	72
73	....	....	....	....	....	1	2	....	2	....	....	....	....	....	2	....	....	1	....	1	1	....	....	73
	32	25	8	20	32	50	71	82	97	8	....	30	25	34	40	34	34	32	36	44	38	33	45	

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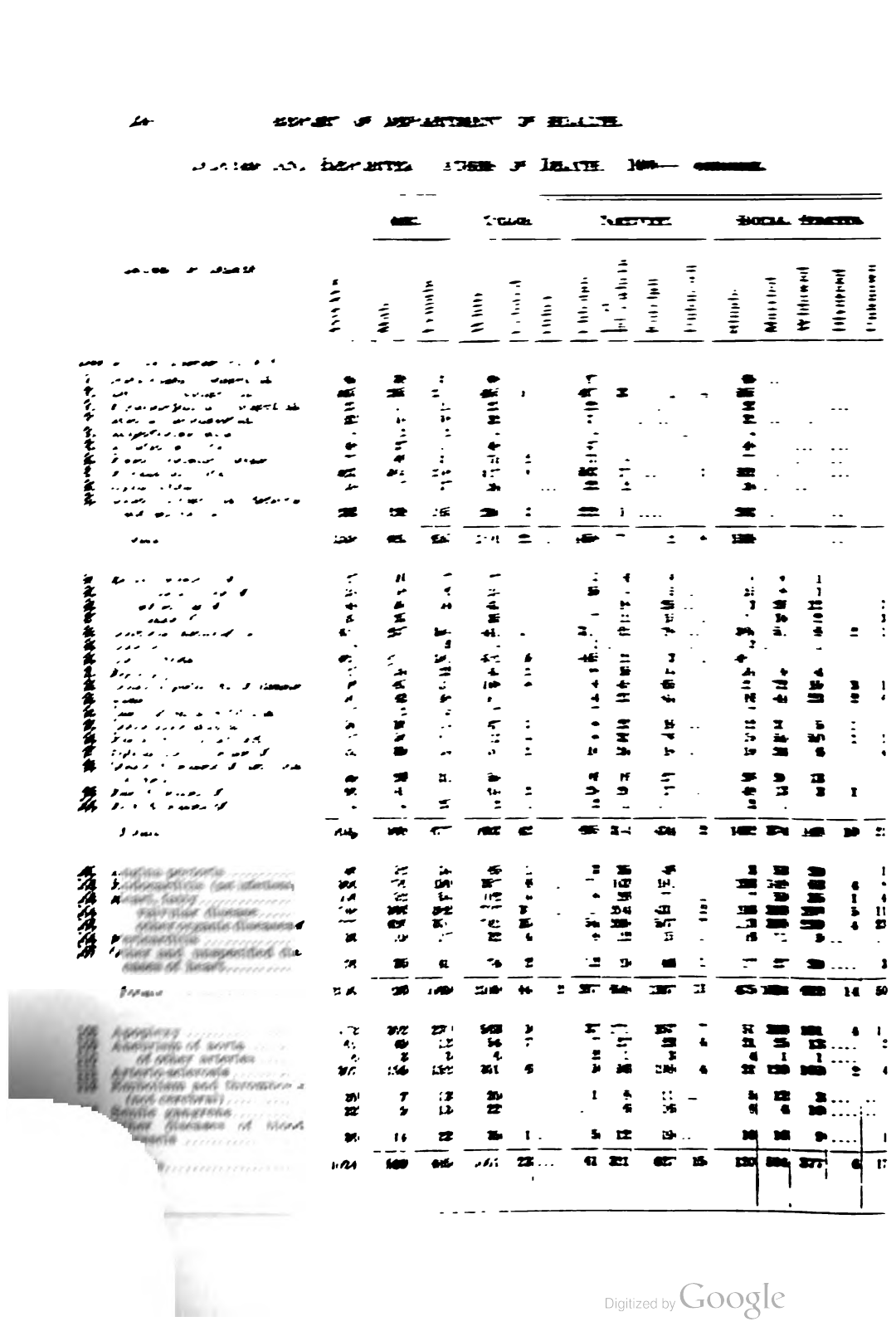
TABLE NO. 7.—DEATHS IN THE STATE OF DELAWARE, 1900.—CONTINUED.



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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
74	69	....	....	....	....	....	....	....	....	....	....	2	3	3	4	6	4	8	10	3	9	6	11	74
75	494	8	1	2	....	....	....	....	....	....	....	39	55	46	48	35	39	41	45	48	43	33	33	75
76	20	3	....	....	....	....	....	....	....	....	....	2	....	3	2	5	1	2	3	....	1	3	1	76
77	31	....	1	....	....	....	....	....	....	....	....	3	1	4	4	2	2	1	3	2	3	3	4	77
78	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	3	....	....	....	78
79	48	....	....	....	....	....	....	....	....	....	....	7	7	5	4	4	7	....	3	....	1	....	9	79
80	76	1	....	....	....	....	....	....	....	....	....	6	8	9	3	11	8	1	4	8	6	8	6	80
81	522	1	....	....	....	....	....	....	....	....	....	56	42	37	42	55	29	46	47	42	42	40	45	81
82	23	....	1	....	....	....	....	....	....	....	....	2	2	2	1	....	3	1	2	4	2	3	2	82
83	233	....	....	....	....	....	....	....	....	....	....	22	11	23	20	15	8	17	26	19	26	25	21	83
	1520	13	3	2	....	....	....	....	....	....	....	139	129	132	127	133	102	118	143	129	133	121	132	
84	2	....	2	4	5	1	1	2	....	....	....	1	....	1	3	2	2	3	1	....	....	3	1	84
85	8	5	....	1	3	1	3	3	....	....	....	2	2	4	2	2	4	3	1	1	....	1	2	85
86	....	....	....	....	1	3	8	7	21	4	....	3	1	6	4	1	4	2	3	5	3	6	6	86
87	1	....	1	5	5	3	11	7	2	....	....	6	2	4	2	....	3	2	1	3	3	6	3	87
88	151	127	58	28	31	16	20	5	12	3	....	40	39	42	42	54	41	35	34	25	28	35	36	88
89	....	....	2	1	....	....	....	....	1	....	....	....	....	....	1	1	....	1	....	1	....	....	....	89
90	420	34	4	1	1	1	....	....	....	....	....	52	47	59	28	34	21	34	33	26	32	47	48	90
91	3	3	....	9	10	10	4	4	3	1	....	7	2	7	2	2	4	1	3	4	3	4	8	91
92	....	....	....	....	3	25	46	24	15	3	....	9	9	11	9	13	6	7	3	5	9	12	24	92
93	....	1	....	3	7	11	14	11	33	11	....	11	12	10	5	4	2	2	5	7	14	5	14	93
94	2	4	1	....	....	....	....	....	....	....	....	2	1	....	....	1	....	....	....	1	....	1	1	94
95	....	....	....	....	2	11	11	20	6	....	....	4	6	2	6	2	7	2	2	3	7	7	2	95
96	2	1	2	1	1	6	6	19	58	21	....	6	14	19	10	9	4	8	12	3	14	8	10	96
97	2	5	....	3	6	7	9	6	11	4	....	6	1	6	7	3	2	2	5	7	8	4	2	97
98	3	8	1	5	2	10	7	6	17	....	....	4	5	11	4	....	7	6	8	2	7	3	2	98
99	4	14	11	8	10	7	5	4	2	1	....	8	6	13	11	5	4	2	6	4	3	....	4	99
100	2	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	2	....	....	....	....	....	....	100
	600	203	82	69	87	112	145	119	181	48	....	161	147	195	137	132	113	110	117	97	131	142	163	
101	....	....	....	1	1	7	20	15	35	7	....	1	9	6	12	3	7	5	6	10	6	15	6	101
102	1	5	21	41	51	29	56	48	97	17	....	37	31	35	26	25	28	30	30	27	34	35	28	102
103	....	....	....	....	1	11	19	30	40	5	....	9	8	10	12	12	8	11	4	9	8	9	6	103
104	9	4	13	55	59	83	105	111	248	61	....	58	57	69	69	52	50	66	54	59	66	76	72	104
105	4	1	5	12	31	59	115	154	327	69	....	58	56	75	89	50	49	46	36	51	92	79	96	105
106	1	1	2	5	4	2	6	8	7	....	....	3	2	4	....	1	3	5	2	3	2	2	8	106
107	5	1	....	3	4	4	5	15	28	11	....	2	....	5	7	16	3	6	9	1	7	9	11	107
	20	12	41	117	151	195	326	381	782	170	....	168	163	204	215	159	148	169	142	160	215	225	227	
108	12	1	2	2	10	28	80	100	282	55	....	67	58	71	54	46	36	42	24	38	41	51	44	108
109	1	....	....	2	3	12	16	18	9	....	....	8	6	7	3	9	4	5	4	....	3	8	4	109
110	....	....	....	....	2	....	2	1	1	....	....	....	....	....	....	1	....	2	....	1	2	....	....	110
111	....	....	....	....	....	1	7	40	187	72	....	30	14	16	26	33	23	23	28	28	25	33	28	111
112	1	1	....	....	4	4	4	2	2	2	....	2	5	....	2	....	3	1	1	....	2	4	....	112
113	....	....	....	....	....	....	....	....	12	10	....	....	....	....	....	5	1	1	5	3	3	2	2	113
114	2	....	1	1	3	1	6	12	9	1	....	6	7	3	6	2	2	6	2	1	....	....	1	114
	16	2	3	5	22	46	115	173	502	140	....	113	90	97	91	96	69	80	64	71	76	98	79	

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[illegible] AND REPORTED CASES OF DISEASE 190[illegible]

	Sex		Color			Nativity			Social Relation				
	Total	Male	Female	White	Colored	Other	[illegible]	[illegible]	[illegible]	[illegible]	Married	Widowed	[illegible]	[illegible]	[illegible]
[illegible]															
[illegible]															
[illegible]														

DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
115	2	5	....	....	....	....	....	....	....	....	....	1	1	1	....	....	1	....	....	....	2	1	....	115
116	1	11	2	....	1	....	....	....	....	....	....	4	....	1	1	1	....	2	2	1	....	3	....	116
117	2	1	....	....	1	....	1	1	....	....	....	2	....	....	....	....	....	....	2	....	....	1	1	117
118	1	1	2	....	3	9	12	33	5	....	....	7	6	8	8	5	5	2	1	2	1	13	8	118
119	....	....	....	2	2	3	4	1	7	....	....	1	2	1	3	....	2	....	7	....	1	....	2	119
120	334	112	11	7	3	4	8	14	64	36	....	47	49	78	84	52	30	28	21	24	35	51	94	120
121	9	7	....	....	3	4	7	13	63	27	....	17	15	12	14	15	6	7	6	4	11	15	11	121
122	....	5	....	1	5	5	3	7	15	1	....	7	4	2	3	8	1	1	3	3	2	4	4	122
123	16	11	4	2	11	8	11	8	19	11	....	13	3	11	6	9	8	11	10	4	7	9	10	123
	365	153	19	12	29	33	46	77	173	75	....	99	80	114	119	90	53	51	52	38	59	97	130	
124	1	1	....	....	1	8	13	26	31	....	....	8	5	5	15	5	7	7	9	6	4	3	7	124
125	3	5	....	2	....	....	....	....	....	....	....	....	....	....	....	1	1	....	3	....	4	1	....	125
126	1	3	5	3	3	4	...	3	1	....	....	1	1	4	3	3	1	1	1	1	4	1	2	126
127	....	....	....	1	7	17	19	20	12	1	...	8	7	5	3	9	5	11	....	10	5	6	8	127
128	117	29	4	2	2	8	17	11	47	17	....	27	25	14	25	26	11	18	16	24	24	21	23	128
129	2	3	....	....	1	1	....	3	5	3	....	3	3	2	....	....	1	1	1	1	3	1	2	129
130	3	11	28	86	76	57	47	17	14	1	....	24	21	29	36	36	15	39	41	21	24	22	32	130
131	2	....	1	1	6	9	16	16	25	5	....	8	4	6	9	5	3	7	14	3	9	7	6	131
132	31	10	6	9	16	23	13	23	39	8	....	14	9	14	14	6	19	17	16	11	18	18	22	132
133	3	....	1	....	4	4	7	3	3	....	....	3	2	2	2	2	....	1	2	2	2	3	4	133
134	1	....	1	1	9	31	80	87	73	3	....	21	25	17	30	20	19	22	22	27	31	20	32	134
135	....	....	1	2	4	5	2	1	5	....	....	1	1	2	....	1	2	2	1	3	1	4	2	135
136	2	3	....	....	2	11	10	5	9	4	....	6	6	5	1	3	1	3	3	4	6	6	2	136
137	2	....	2	2	4	1	2	....	3	1	....	1	1	3	2	1	1	2	1	....	2	1	2	137
138	....	....	....	....	1	1	1	....	1	1	....	1	....	....	4	....	....	....	....	....	....	....	....	138
139	7	2	....	1	4	10	11	8	13	...	....	4	4	4	....	5	4	1	9	5	7	8	5	139
	175	67	49	110	140	190	238	223	281	44	....	130	114	112	144	123	90	132	139	118	144	122	149	
140	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	1	140
141	4	1	1	....	....	5	1	1	1	....	....	....	....	1	2	2	2	2	....	....	....	3	2	141
142	....	....	....	1	....	1	2	....	1	....	....	....	....	1	2	....	....	....	....	1	....	1	....	142
143	1	....	....	1	2	4	5	4	....	....	....	1	3	2	4	....	1	....	....	2	1	....	3	143
	5	1	1	2	2	11	8	5	3	....	....	1	3	4	8	2	3	2	....	3	2	4	6	
144	30	27	21	9	43	61	41	43	58	15	....	31	31	31	31	35	24	21	35	19	21	38	31	144
145	8	5	8	37	114	238	355	349	585	81	....	174	133	121	162	151	147	139	144	161	140	136	172	145
146	....	....	....	....	1	2	2	2	6	....	....	....	....	....	3	....	2	....	3	3	1	1	....	146
147	....	....	....	....	1	1	1	2	26	3	....	5	3	2	....	6	....	4	3	3	2	3	3	147
148	....	....	....	1	....	....	3	....	1	....	....	1	....	....	1	....	....	....	....	1	....	1	1	148
149	....	....	....	....	....	1	1	10	26	2	....	....	4	3	2	2	4	2	4	3	3	8	5	149
150	3	....	....	1	2	1	10	7	13	3	....	1	....	....	....	4	3	8	6	2	7	6	3	150
151	2	....	....	1	3	5	10	....	9	1	....	2	2	....	1	1	....	4	6	5	6	1	3	151
	43	32	29	49	164	309	423	413	724	105	....	214	173	157	200	199	180	178	201	197	180	194	218	

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	CAUSES OF DEATH.	TOTALS.	SEX.		COLOR.			NATIVITY.					SOCIAL STATUS.				
			Male.	Female.	White.	Colored.	Other.	Chicago.	U. S. Elsewhere.	Foreign.	Unknown.		Single.	Married.	Widowed.	Divorced.	Unknown.
	Deaths from Disease—Cont'd.																
152	Fallopian tubes, diseases of	65	.....	65	57	8	....	5	33	26	1		14	42	7	1	1
153	Ovarian tumor (non-malignant)	9	.....	9	8	1	....	....	6	3	....		3	4	2	....	....
154	Ovaries, other diseases of	9	.....	9	9	....	....	1	5	3	....		1	7	1	....	....
155	Uterus, tumor of (non-malignant)	35	.....	35	32	3	....	4	19	11	1		5	25	3	....	2
156	Uterus, other diseases of	20	.....	20	18	2	....	1	9	9	1		.....	16	3	....	1
157	Other diseases of female genital organs	25	.....	25	23	2	....	6	12	7	....		8	16	1	....	....
	Totals	163	.....	163	147	16	.. .	17	84	59	3		31	110	17	1	4
158	Abortion and miscarriage	18	.....	18	18	....	....	4	7	7	....		1	17	....	....	....
159	Extra-uterine pregnancy	26	.....	26	23	3	....	3	8	14	1		2	22	1	1	....
160	Other accidents of pregnancy	31	.....	31	31	....	....	4	5	22	....		.....	30	1	....	....
161	Placenta previa	17	.....	17	16	1	....	1	6	9	1		.....	17	..	....	....
162	Puerperal convulsions	33	.....	33	32	1	....	8	12	13	....		3	30	....	....	....
163	hemorrhage	14	.....	14	13	1	....	2	3	8	....		.....	14	....	....	....
164	Other puerperal affections	26	.....	26	25	1	....	8	8	10	....		2	23	1	....	....
	Totals	165	.....	165	158	7	....	31	49	83	2		8	153	3	1	....
165	Arthritis, periostitis	17	13	4	17	....	....	8	5	4	....		13	4	....	....	....
166	Caries necrosis	5	3	2	5	....	....	1	2	2	....		2	2	....	....	1
167	Other diseases of locomotor system	8	6	2	8	....	....	1	3	4	....		4	2	2	....	....
168	Eczema	5	4	1	5	....	....	4	1	.....	....		5	....	....	....	....
169	Pemphigus	8	5	3	8	....	....	5	....	3	....		7	1	....	....	....
170	Other diseases of skin	4	3	1	4	....	....	3	....	1	....		2	2	....	....	....
	Totals	47	34	13	47	....	....	22	11	14	....		33	11	2	....	1
	DEATHS FROM VIOLENCE.																
	Suicide—																
171	Suicide, by arsenic	3	.....	3	3	....	....	3	.....	.....	....		.....	2	....	....	1
172	carbolic acid	53	39	14	53	....	....	7	14	29	3		11	32	5	....	5
173	morphine-opium	5	1	4	4	1	....	1	2	1	1		1	2	....	....	2
174	other poisons	39	21	18	39	....	....	5	19	14	1		16	15	6	....	2
175	asphyxia	54	38	16	54	....	....	11	16	25	2		11	29	9	2	3
176	crushing	7	7	.....	7	....	....	....	3	3	1		3	3	....	....	1
177	cutting instruments	21	18	3	20	1	....	2	3	15	1		8	9	2	....	2
178	drowning	15	9	6	15	....	....	2	6	5	2		4	8	....	....	3
179	firearms	145	126	19	145	....	....	15	36	83	11		52	70	10	3	10
180	hanging	40	34	6	39	....	1	1	4	32	3		10	19	6	3	2
181	jumping from high places	13	9	4	13	....	....	1	6	5	1		5	6	....	....	2
182	other modes	5	2	3	4	1	....	....	3	2	....		2	1	2	....	....
	Totals	400	304	96	396	3	1	48	112	214	26		123	196	40	8	33

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Continued.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
152	....	....	....	1	20	21	18	4	1	....	....	7	5	3	10	8	3	5	6	7	7	1	3	152
153	....	....	....	....	2	4	2	....	1	....	....	1	1	....	2	1	....	1	1	....	....	....	2	153
154	....	....	....	4	3	2	....	....	....	....	....	2	....	2	....	1	1	2	....	....	1	....	....	154
155	....	....	....	....	4	10	14	5	2	....	....	3	3	3	5	3	3	4	....	5	2	1	3	155
156	....	....	....	....	2	7	9	2	....	....	....	2	2	3	3	1	4	1	1	1	1	1	....	156
157	....	1	....	5	6	8	3	1	1	....	....	1	1	2	1	2	....	1	5	....	2	3	7	157
	....	1	....	10	37	52	46	12	5	....	....	16	12	13	21	16	11	14	13	13	13	6	15	
158	....	....	....	....	11	6	1	....	....	....	....	.....	1	11	2	2	1	....	1	....	....	....	....	158
159	....	....	....	....	13	11	2	....	....	....	....	.....	3	2	4	....	3	3	4	1	1	2	3	159
160	....	....	....	....	12	15	3	1	....	....	....	5	3	3	5	5	2	....	3	....	3	1	1	160
161	....	....	....	....	22	12	2	....	....	....	....	2	....	1	1	1	1	1	2	2	....	4	2	161
162	....	....	....	....	22	9	2	....	....	....	....	.....	2	4	3	1	2	4	2	5	5	4	1	162
163	....	....	....	1	3	10	....	....	....	....	....	2	1	1	1	1	....	3	....	2	1	2	....	163
164	....	....	....	1	10	12	2	1	....	....	....	3	1	1	2	2	1	4	1	3	2	3	3	164
	....	....	.. .	2	74	75	12	2	....	....	....	12	11	23	18	12	10	15	13	13	12	16	10	
165	....	4	4	4	2	1	1	1	....	....	....	.....	....	....	1	3	2	1	3	4	....	1	2	165
166	....	....	....	....	3	....	....	2	....	....	....	1	....	....	....	....	1	....	.. .	....	....	2	....	166
167	....	....	1	1	....	....	1	3	1	1	....	.....	....	....	2	1	1	1	1	....	....	2	....	167
168	4	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	2	2	....	....	....	....	168
169	4	1	....	....	1	....	2	....	....	....	....	.....	1	....	1	1	1	1	....	1	....	1	1	169
170	2	....	....	....	....	1	1	....	....	....	....	.....	1	....	....	....	....	....	....	2	....	....	1	170
	10	6	5	5	6	2	5	6	1	1	....	2	2	....	4	5	5	5	6	8	....	6	4	
171	....	....	....	1	2	....	....	....	....	....	....	.....	1	....	....	....	....	....	....	1	....	....	1	171
172	....	....	....	3	9	10	16	8	5	2	....	4	3	6	4	9	3	2	4	5	6	3	4	172
173	....	....	....	....	1	3	1	....	....	....	....	.....	....	....	1	....	1	1	....	....	....	1	1	173
174	....	....	....	4	10	9	8	6	2	....	....	3	6	1	4	1	2	6	2	2	6	4	2	174
175	....	....	....	1	11	12	9	13	8	....	....	7	5	1	4	2	3	3	5	5	11	4	4	175
176	....	....	....	....	2	1	3	1	....	....	....	.....	....	....	....	1	1	....	3	2	....	....	....	176
177	....	....	....	1	4	5	9	....	2	....	....	6	....	3	1	....	1	2	....	....	4	....	4	177
178	....	....	....	2	1	4	5	1	2	....	....	.....	1	....	1	2	1	2	1	3	2	....	2	178
179	....	....	....	6	38	33	26	23	19	1	....	14	16	7	9	11	13	12	13	11	15	13	11	179
180	....	....	....	....	4	8	11	10	6	1	....	1	3	2	1	3	8	3	5	3	5	1	5	180
181	....	....	....	....	5	5	3	....	....	....	....	1	3	1	....	4	....	2	....	1	....	....	1	181
182	....	....	....	....	3	....	1	1	....	....	....	2	....	1	....	....	....	....	1	....	....	....	1	182
	....	....	....	18	90	90	92	62	44	4	....	38	38	22	25	33	33	33	34	33	49	26	36	

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Concluded.*

	CAUSES OF DEATH.	TOTALS.	SEX.		COLOR.			NATIVITY.				SOCIAL STATUS.				
			Male.	Female.	White.	Colored.	Other.	Chicago.	U. S. Elsewhere.	Foreign.	Unknown.	Single.	Married.	Widowed.	Divorced.	Unknown.
	Accidents—															
183	Drowning	142	137	5	141	1	....	36	38	38	30	78	24	7	1	32
184	Asphyxiation by gas	122	86	36	120	2	....	6	28	79	9	43	53	14	2	10
185	suffocation	32	23	9	32	....	....	17	4	10	1	24	8	....	....	....
186	Burns	109	49	60	105	4	....	37	22	46	4	62	33	12	....	2
187	corrosives	1	....	1	1	....	....	....	1	....	....	....	....	1	....	....
188	Scalds	25	20	5	25	....	....	16	3	6	....	22	2	1	....	....
189	Electric shock	22	22	....	22	....	....	5	8	9	....	9	10	1	....	1
190	Lightning	3	2	1	3	....	....	1	....	2	....	1	2	....	....	....
191	Falls	283	244	39	276	7	....	36	76	159	12	109	131	30	3	10
192	Fractures	25	18	7	25	....	....	4	9	11	1	7	8	9	....	1
193	Firearms	33	33	2	33	2	....	8	7	8	2	10	11	....	1	1
194	Freezing	5	4	1	4	1	....	....	3	1	1	3	2	....	....	....
195	Heat and sunstroke	58	42	16	57	1	....	11	10	37	....	21	30	6	....	1
196	Injuries by elevators	31	30	1	31	....	....	9	8	13	1	17	11	3	....	....
197	explosions	13	11	2	13	....	....	2	3	8	....	3	8	2	....	....
198	falling objects	30	29	1	30	....	....	1	6	23	....	14	13	2	1	....
199	machinery	32	31	1	32	....	....	2	11	17	2	12	18	1	....	1
200	railroad, steam	309	280	29	304	5	....	32	97	165	15	114	153	21	3	18
201	street	167	141	26	165	2	....	33	47	84	3	81	56	28	....	2
202	vehicles and horses	95	86	9	94	1	....	34	19	39	3	55	30	5	1	4
203	Poisons, acute, accidental	41	26	15	39	1	....	11	9	14	7	23	9	5	....	4
204	Other accidents	93	79	14	92	1	1	20	23	41	9	38	37	9	9	....
	Totals	1663	1383	280	1634	28	1	321	432	810	100	746	649	157	21	90
	Manslaughter—															
205	Homicide	162	128	34	137	25	....	26	45	74	17	89	63	3	1	6
206	Legal execution	5	5	....	3	2	....	1	2	2	....	2	1	2	....	....
	Totals all forms of violence	167	133	34	140	27	....	27	47	76	17	91	64	5	1	6
	DEATHS FROM ILL-DEFINED CAUSES:															
207	Abscess	3	2	1	3	....	....	....	1	1	1	2	1	....	....	....
208	Atrophy, debility	48	33	15	47	1	....	39	4	5	....	43	2	1	2	....
209	Old age	158	66	92	152	6	....	....	36	119	3	18	22	115	1	2
210	Other ill-defined	33	26	7	31	2	....	19	3	10	1	24	6	2	....	1
211	Unknown causes	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	Totals	242	117	125	233	9	....	58	44	135	5	87	31	118	3	3

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DEATHS AND REPORTED CAUSES OF DEATH: 1906—*Concluded.*

	AGES.											MONTHS.												
	Under 1 year.	1 to 5 years.	5 to 10 years.	10 to 20 years.	20 to 30 years.	30 to 40 years.	40 to 50 years.	50 to 60 years.	60 to 80 years.	Over 80 years	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
183	1	2	6	35	25	25	23	14	9	....	2	3	....	1	13	20	21	27	23	16	7	8	3	183
184	1	1	....	4	38	23	18	16	18	3	....	5	9	6	21	12	11	6	5	5	11	19	12	184
185	18	2	....	2	3	3	3	1	....	....	....	1	2	2	2	2	2	....	3	4	1	4	9	185
186	4	27	12	10	14	7	9	11	11	4	....	13	12	7	9	10	3	11	5	9	12	10	8	186
187	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	187
188	4	15	1	1	....	....	2	1	....	1	....	1	1	3	2	1	1	4	3	1	2	2	4	188
189	....	....	....	3	11	6	2	....	....	....	....	....	1	....	1	3	....	....	4	5	2	1	5	189
190	....	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	....	....	190
191	2	11	7	9	45	56	60	38	50	5	....	28	19	14	20	25	25	25	25	26	22	22	29	191
192	1	....	....	1	5	3	1	3	8	3	....	2	....	3	1	2	2	5	2	1	2	1	4	192
193	....	1	....	7	8	1	5	2	1	....	....	2	....	2	1	2	2	1	4	6	....	3	2	193
194	1	....	....	....	....	1	1	1	1	....	....	1	....	....	3	....	....	....	....	....	....	1	....	194
195	4	1	3	4	3	9	12	11	7	4	....	....	....	....	....	....	....	7	7	37	6	1	....	195
196	....	....	1	10	5	3	3	5	4	....	....	1	1	3	2	3	1	2	3	5	2	5	3	196
197	....	....	....	2	4	4	1	....	2	....	....	1	1	....	....	1	2	2	1	2	....	2	1	197
198	....	....	....	2	13	6	7	1	1	....	....	1	....	3	1	4	3	5	1	3	....	4	5	198
199	....	....	1	1	12	8	7	2	1	....	....	2	2	3	5	5	2	2	2	3	3	1	2	199
200	....	1	2	32	84	53	69	38	29	1	....	33	28	29	27	21	18	16	18	22	29	30	38	200
201	....	7	12	25	22	24	31	24	16	6	....	19	11	10	10	13	13	22	11	21	10	12	15	201
202	2	6	18	17	3	15	7	14	12	1	....	7	5	5	3	13	10	12	12	8	10	4	6	202
203	1	11	2	1	9	3	9	5	....	....	....	3	6	3	5	2	3	5	4	2	....	5	3	203
204	6	4	2	9	15	20	18	10	9	....	....	8	6	7	7	8	13	9	7	7	6	6	9	204
	45	89	67	176	320	271	289	197	179	28	2	131	104	101	133	150	139	163	170	153	120	140	159	
205	19	3	1	12	55	41	18	7	6	....	....	12	11	14	12	14	11	12	15	16	17	11	17	205
206	....	....	....	....	1	1	2	1	....	....	....	....	3	....	....	....	1	....	....	....	1	....	....	206
	19	3	1	12	56	42	20	8	6	....	....	12	14	14	12	14	12	12	15	16	18	11	17	
207	....	....	....	....	....	1	....	1	1	....	....	1	....	....	....	....	....	1	....	1	....	....	....	207
208	35	6	2	....	....	....	....	....	3	....	....	....	2	....	....	....	2	....	10	7	14	3	10	208
209	....	....	....	....	....	....	....	....	67	91	....	20	13	23	19	11	5	14	7	7	12	15	12	209
210	16	5	1	....	....	3	3	....	4	1	....	1	5	11	1	3	3	7	1	....	1	....	....	210
211	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	211
	51	11	3	....	....	4	3	1	74	95	....	22	20	34	20	14	10	22	18	15	27	18	22	

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Ages of Decedents and Death Rates per 1000 Living at Given Ages: 1906.

Ages.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Death Rate per 1000.
Under 5 years	636	661	686	768	743	806	776	807	825	881	687	749	8,919	6.
Under 1 year	494	454	504	468	485	444	504	498	501	485	423	559	5,715	146.
From 1 to 2 years	93	99	99	120	123	91	111	126	105	114	94	128	1,293	24.
2 to 3	46	46	47	64	54	52	55	55	59	62	55	57	646	5.
3 to 4	31	32	33	37	46	33	36	33	34	36	38	44	413	3.
4 to 5	22	22	28	29	22	26	30	22	14	21	30	22	295	2.
5 to 10	62	52	75	85	83	82	74	85	67	67	48	85	865	1.
10 to 20	101	105	116	112	111	96	107	119	98	90	91	124	1,265	1.
20 to 30	243	126	234	272	256	197	215	215	225	214	216	262	2,744	1.
30 to 40	205	241	256	295	289	282	231	243	226	254	238	280	3,044	2.
40 to 50	229	207	275	264	242	252	276	242	253	282	282	294	3,051	4.
50 to 60	290	250	292	319	277	224	256	289	241	256	282	294	3,270	22.
60 to 70	272	286	228	284	227	194	221	261	196	234	232	280	2,915	48.
70 to 80	211	167	200	204	150	121	169	134	122	174	170	150	1,977	77.
80 to 90	81	62	90	94	77	44	80	51	72	75	86	92	854	95.
90 to 100	6	7	9	12	7	6	9	9	7	7	11	11	101	11.
100 years and upwards	1	..	2	2	..	1	..	..	..	..	1	1	8	77.
Unknown ages	..	..	..	..	2	..	..	..	..	..	..	..	2	0.32
Total	2586	2217	2483	2774	2567	1947	2313	2487	2287	2333	2286	2653	29093	

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NATIVITY, SEX, SOCIAL RELATION AND COLOR OF DECEDENTS: 1906.

NATIVITY.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
PLACE OF BIRTH.													
Chicago	867	769	903	927	955	702	967	1188	999	875	841	990	10983
Illinois	114	116	106	122	97	87	103	89	87	113	89	115	1238
United States, elsewhere	475	423	436	569	459	325	369	372	373	401	441	451	5094
Germany	320	230	314	340	310	250	247	200	251	309	312	288	3371
Ireland	213	180	183	202	172	138	153	142	127	156	180	201	2047
Italy	26	33	29	34	43	41	24	23	20	28	35	41	377
Canada	51	44	40	31	41	34	36	43	40	41	40	54	495
Scandinavia	138	106	136	129	108	70	106	101	104	117	113	121	1349
Slavonia	100	91	89	104	51	41	40	71	55	69	76	101	888
Other foreign	206	170	181	248	255	218	246	218	241	202	223	275	2683
Unknown	56	55	46	68	66	41	22	40	30	22	36	41	523
Total	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048
SEX.													
Male	1464	1248	1390	1591	1516	1143	1327	1441	1329	1326	1360	1549	16684
Female	1102	969	1073	1183	1041	804	986	1046	998	1007	1026	1139	12364
Total	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048
SOCIAL RELATION.													
Single	1214	1097	1193	1356	1300	989	1285	1487	1293	1168	1110	1383	14875
Married	870	736	849	951	819	645	734	673	699	779	859	843	9457
Widowed	401	316	368	426	385	268	251	271	290	345	373	404	4098
Divorced	10	10	15	13	12	12	10	9	14	20	5	7	137
Unknown	71	58	38	28	41	33	33	47	31	21	39	41	481
Total	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048
COLOR.													
White	2477	2122	2380	2688	2476	1883	2244	2411	2258	2248	2325	2608	28120
Colored	87	94	82	84	80	61	68	74	67	83	59	66	905
Other	2	1	1	2	1	3	1	2	2	2	2	4	23
Total	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048

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TOTAL NUMBER OF DEATHS FROM THE TWENTY PRINCIPAL CAUSES OF DEATH, BY MONTHS: 1906.

(Causes of death arranged in order of highest mortality.)

CAUSES OF DEATH	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	Percentage of Total Mortality.
Pneumonia	474	413	421	549	473	246	151	129	151	240	350	450	4047	13.90
Tuberculoses [a	348	281	356	409	373	270	309	305	293	305	287	301	3837	13.21
Diarrheal diseases	113	116	119	126	124	113	413	608	470	265	123	127	2717	9.35
Violence [b	181	156	137	170	197	184	208	219	202	187	177	212	2230	7.69
Heart diseases	168	163	204	215	159	148	169	142	160	215	225	227	2195	7.56
Nephritis	205	164	152	193	186	171	160	179	180	161	174	203	2128	7.33
Cancer	131	107	91	116	119	100	104	121	109	106	111	113	1328	4.57
Bronchitis	64	64	90	98	67	36	35	27	28	46	66	105	726	2.50
Apoplexy	67	58	71	54	46	36	42	24	38	41	51	44	572	1.97
Diphtheria	53	38	44	38	33	24	38	22	31	56	80	90	547	1.88
Premature birth	56	42	37	42	55	29	46	47	42	42	40	45	523	1.80
Infantile debility	39	55	46	48	35	39	41	45	48	43	33	33	505	1.74
Convulsions	52	47	59	28	34	21	34	33	26	32	47	48	461	1.59
Cerebral meningitis	40	39	42	42	54	41	35	34	25	28	35	36	451	1.55
Typhoid fever	27	19	28	34	29	29	20	29	49	37	39	30	370	1.27
Appendicitis	24	21	29	36	36	15	39	41	21	24	22	32	340	1.17
Cirrhosis of liver	21	25	17	30	20	19	22	22	27	31	20	32	286	0.98
Gastritis	27	25	14	25	26	11	18	16	24	24	21	23	254	0.87
Whooping cough	2	5	9	14	19	11	14	16	30	13	18	16	167	0.57
Measles	6	6	7	16	33	19	9	4	5	3	8	12	128	0.44

a] Including deaths from Tuberculosis of lungs.

b] Including deaths from Suicide.

DEATHS FROM THE PRINCIPAL CONTAGIOUS AND INFECTIOUS DISEASES: 1897 TO 1906, INCLUSIVE.

CAUSES OF DEATH.	1906	1905	1904	1903	1902	1901	1900	1899	1898	1897
Cerebro-spinal fever	6	16	3	1	4	9	6	18	17	.....
Diphtheria	547	426	395	614	596	495	797	843	622	702
Influenza	119	153	114	166	118	201	160	311	231	15
Measles	128	231	47	276	123	158	194	108	55	137
Scarlet fever	493	79	143	296	445	165	226	533	67	81
Smallpox	.....	61	29	47	5	4	2	1	.....	2
Typhoid fever	370	329	373	588	801	509	337	442	636	437
Whooping cough	167	359	113	270	266	207	285	77	208	160
Other acute contagious or infectious disease	8	7	2	5	3	2	2	10	3	4
Totals	1838	1661	1219	2263	2361	1750	2009	2403	1889	1538
Diarrheal diseases	2717	2534	2141	2218	2243	2219	2218	2517	2224	2475
Pneumonia	4047	3562	4138	4629	3433	3127	3389	3438	2477	2152
Tuberculosis, pulmonary	3224	3203	3131	2869	2556	2495	2599	2516	2416	2180

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COMPARATIVE MORTALITY FROM SPECIFIED DISEASES, FROM ALL CAUSES AND MORTALITY OF CHILDREN, BY QUARTERS FOR FIVE YEARS, 1902–1906.

DISEASES.	TOTAL WINTER MORTALITY. (Jan., Feb. and Mar.)					TOTAL SPRING MORTALITY. (April, May and June)					TOTAL SUMMER MORTALITY. (July, Aug. and Sept.)					TOTAL AUTUMN MORTALITY. (Oct., Nov. and Dec.)				
	1906	1905	1904	1903	1902	1906	1905	1904	1903	1902	1906	1905	1904	1903	1902	1906	1905	1904	1903	1902
Diphtheria	135	114	108	138	157	95	78	81	141	114	91	81	63	120	100	226	153	143	215	225
Influenza	46	125	71	108	82	39	11	15	41	23	3	2	....	2	1	31	15	28	15	12
Measles	19	64	3	68	20	68	121	13	169	49	18	22	7	28	25	23	24	24	11	29
Scarlet fever	104	22	59	103	150	175	16	45	112	169	86	14	17	38	61	128	27	22	43	65
Smallpox	....	34	1	23	1	....	18	1	18	3	....	9	8	6	....	....	....	19	....	1
Typhoid	74	68	97	201	55	92	59	77	80	62	98	98	98	170	402	106	104	101	137	282
Whooping cough	16	94	3	116	41	44	164	18	93	63	60	83	41	47	99	47	18	51	14	63
Diarrheal diseases	348	301	272	275	237	363	300	308	336	282	1491	1513	1173	1262	1314	515	456	388	345	410
Pneumonia	1308	1527	1812	1672	1240	1238	817	1103	1492	941	431	371	367	397	397	1040	867	856	477	855
Consumption, pulmonary	845	872	859	785	688	846	827	825	786	662	754	722	714	657	585	779	782	733	641	621
Cancer	329	273	281	257	268	335	286	272	255	267	334	315	267	288	254	330	317	304	266	285
Rabies	3	2	5	3	....	....	3	1	2	5	1	1	3	3	6	....	2	5	3	5
Tetanus	8	3	9	9	2	13	9	8	18	15	22	23	19	35	28	8	6	8	12	10
Cerebral meningitis	121	116	114	156	140	137	95	122	159	164	94	126	102	153	168	99	101	104	118	129
Convulsions	158	187	197	186	186	83	116	126	164	167	93	105	109	121	142	127	108	121	147	156
Heart diseases	535	506	576	597	580	522	566	523	524	553	471	509	446	450	441	667	529	498	537	532
Apoplexy	196	205	209	172	172	135	172	205	146	157	104	150	140	147	124	136	175	199	170	151
Bronchitis	218	366	358	387	382	201	207	195	290	222	90	99	77	122	116	217	176	206	206	258
Nephritis	521	489	482	431	339	550	540	492	431	375	519	453	397	393	326	538	535	477	459	387
Suicide	98	108	105	127	91	91	116	104	118	116	100	109	121	114	119	111	97	93	123	113
Violence, other than suicide	376	340	350	321	284	460	416	385	357	361	529	500	500	484	409	465	421	356	944	396
Total, all causes	7246	5782	5971	6135	5115	7278	4937	4919	5732	4770	7127	5305	4669	5037	5117	7397	4913	4736	4883	4985
Under one year of age	1442	1631	1384	1364	1339	1335	1205	1013	1166	1053	1923	1852	1519	1687	1618	1414	1143	1109	1099	1134
One to five years of age	571	756	566	809	669	699	703	442	851	695	695	713	512	727	806	713	511	507	574	713
Total, under five years	2013	2387	1950	2173	2008	2034	1908	1455	2017	1748	2618	2565	2031	2414	2424	2127	1654	1616	1673	1847

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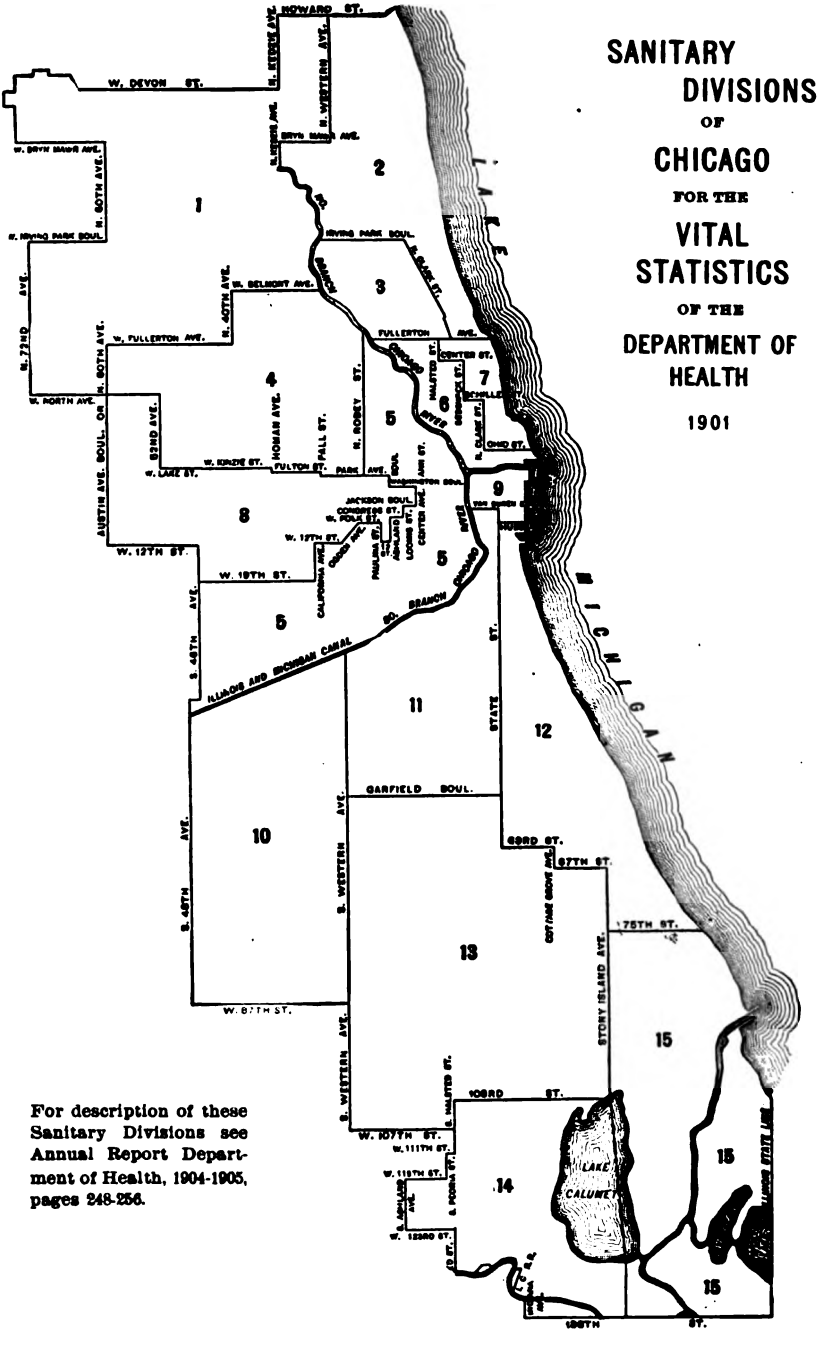

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SANITARY DIVISION STATISTICS—1906.

POPULATION — AREA — DENSITY OF POPULATION — DEATHS AND DEATH RATES FROM ALL CAUSES, FROM CERTAIN DISEASES AND BY AGE GROUPS.

DISTRICTS.	Population 1906.	Per cent of Total Population.	Area. Acres.	Number Persons to each Acre 1906.	DEATHS AND DEATH RATES AT CERTAIN AGE GROUPS AND FROM IMPORTANT CAUSES.															
					Deaths—All Causes.	Rate per 1000 of Division Population.	Deaths Children Under 1 Year of Age.	Rate per 1000 of Division Population.	Deaths Children 1 to 5 Years of Age.	Rate per 1000 of Division Population.	Deaths from Certain Contagious Diseases.	Rate per 10 000 of Division Population.	Deaths from Consumption of Lungs.	Rate per 10 000 of Division Population.	Deaths from Pneumonia.	Rate per 10 000 of Division Population.	Deaths from Diarrheal Diseases.	Rate per 10 000 of Division Population.	Deaths from Typhoid Fever.	Rate per 10 000 of Division Population.
Sanitary Divisions—																				
First	23 976	1.17	16 960	1.41	294	12.26	47	1.96	22	0.92	*		16	6.67	27	11.26	35	14.60	17	7.09	6	2.50
Second	73 771	3.60	6 652	11.09	780	10.57	104	1.41	48	0.65	26	3.52	64	8.68	75	10.17	34	4.61	15	2.03
Third	96 312	4.70	2 460	39.15	1 014	10.53	196	2.04	72	0.75	49	5.09	122	12.67	124	12.87	76	7.89	7	0.73
Fourth	195 287	9.53	9 280	21.04	2 539	13.00	483	2.47	239	1.22	179	9.17	265	13.57	328	16.80	184	9.42	36	1.84
Fifth	503 050	24.50	7 866	63.83	7 816	15.57	1 988	3.96	1 052	2.10	437	8.70	943	18.78	1 248	24.86	1 012	20.16	71	1.41
Sixth	133 197	6.50	1 860	71.61	1 870	14.04	341	2.56	159	1.19	66	4.96	229	17.19	297	22.30	168	12.61	28	2.10
Seventh	51 220	2.50	979	52.33	556	10.89	83	1.62	10	0.20	7	1.37	43	8.39	64	12.49	23	4.49	5	0.98
Eighth	188 525	9.20	7 410	25.44	2 060	10.93	277	1.47	130	0.69	81	4.30	219	11.62	256	13.58	81	4.30	29	1.54
Ninth	8 812	0.43	640	13.77	145	16.45	8	0.91	2	0.23	2	2.27	37	41.99	22	24.97	3	3.40	2	2.26
Tenth	16 903	0.82	12 000	1.40	225	13.39	43	2.56	22	1.31	16	9.52	26	15.47	27	16.07	18	10.71	4	2.38
Eleventh	292 009	14.25	7 120	41.01	4 367	14.96	1 048	3.59	468	1.60	180	6.16	603	20.65	715	24.49	500	17.12	59	2.02
Twelfth	210 041	10.25	7 200	29.17	2 339	11.14	270	1.29	90	0.43	57	2.71	221	10.52	299	14.24	106	5.05	27	1.29
Thirteenth	160 861	7.85	18 240	8.82	1 790	11.13	352	2.19	137	0.85	90	5.59	167	10.38	215	13.37	113	7.02	27	1.68
Fourteenth	36 885	1.80	8 640	4.27	516	13.99	148	4.01	55	1.49	45	12.20	36	9.76	49	13.29	67	18.16	11	2.98
Fifteenth	59 426	2.90	14 400	4.13	789	13.28	343	5.77	123	2.07	59	9.93	78	13.13	144	25.07	140	23.56	20	3.37

* Diphtheria, Measles, Scarlet-Fever, Whooping Cough.

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MORTALITY FROM ALL CAUSES, BY SANITARY DIVISIONS AND MONTHS: 1906.

TOTAL DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total
Sanitary Division—													
First	26	21	24	25	32	19	23	28	20	24	24	28	294
Second	89	70	62	70	61	66	57	41	58	65	69	72	780
Third	94	60	97	93	94	75	91	78	65	75	102	90	1014
Fourth	229	188	194	238	231	182	193	226	203	202	220	233	2539
Fifth	633	568	615	753	718	530	652	769	663	603	616	696	7816
Sixth	152	140	150	178	177	117	134	150	141	153	174	204	1870
Seventh	56	50	41	46	41	45	47	39	50	46	42	55	558
Eighth	207	158	203	203	203	140	141	139	153	154	163	196	2060
Ninth	12	18	9	17	17	13	10	11	11	12	5	10	145
Tenth	21	16	21	15	22	10	17	18	11	17	18	39	225
Eleventh	388	319	377	385	360	269	374	415	388	371	338	383	4367
Twelfth	216	194	215	248	180	162	176	145	187	195	202	219	2339
Thirteenth	146	155	166	201	136	118	119	139	131	161	158	160	1790
Fourteenth	51	46	55	47	35	30	32	42	43	39	49	47	516
Fifteenth	89	89	84	93	85	58	97	84	68	82	79	81	789
Public Institutions and Places	157	125	150	162	165	113	150	163	135	134	127	165	1746
Total	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048

CHILD MORTALITY—UNDER ONE YEAR OF AGE, BY SANITARY DIVISIONS AND MONTHS: 1906

CHILD MORTALITY UNDER ONE YEAR OF AGE DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	2	5	3	6	4	2	2	5	6	3	3	6	47
Second	12	13	10	11	6	8	3	8	8	9	4	12	104
Third	21	18	17	15	12	12	22	23	13	12	18	13	196
Fourth	34	37	37	34	40	30	46	53	61	42	37	32	483
Fifth	147	133	149	145	180	104	219	282	197	152	132	148	1988
Sixth	23	25	26	28	24	20	30	44	35	26	19	41	341
Seventh	9	8	6	11	3	5	10	3	7	7	4	10	83
Eighth	27	19	29	33	28	15	12	25	22	19	13	29	277
Ninth	....	....	1	1	....	1	....	....	2	1	....	2	8
Tenth	4	5	3	2	1	2	6	4	3	3	2	8	43
Eleventh	72	67	89	77	77	56	111	142	103	87	71	96	1048
Twelfth	25	28	21	26	16	15	24	19	26	21	24	26	270
Thirteenth	25	34	40	25	26	28	21	36	36	29	24	28	352
Fourteenth	19	14	15	15	8	6	11	20	14	8	11	7	148
Fifteenth	29	31	27	26	26	18	40	39	23	23	30	31	343
Public Institutions and Places	35	17	31	39	46	22	28	46	28	38	22	31	383
Total	484	454	504	494	497	344	585	749	589	480	414	520	6114

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CHILD MORTALITY, ONE TO FIVE YEARS OF AGE, BY SANITARY DIVISIONS AND MONTHS: 1906.

CHILD MORTALITY ONE TO FIVE YEARS DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	2	2	3	1	2	1	1	2	....	2	2	4	22
Second	6	4	6	2	4	4	4	4	2	5	3	4	48
Third	4	2	6	10	7	8	4	7	8	4	6	6	72
Fourth	11	17	14	18	20	27	23	26	20	15	23	25	239
Fifth	66	73	68	104	101	74	82	107	99	95	80	103	1052
Sixth	15	10	9	13	13	11	12	11	10	9	15	31	159
Seventh	1	1	...	....	1	....	2	..	....	3	1	1	10
Eighth	16	6	11	17	19	8	10	10	4	6	11	12	130
Ninth	....	1	....	....	....	....	....	....	....	....	...	1	2
Tenth	....	1	3	....	4	5	3	...	....	....	1	5	22
Eleventh	37	27	35	36	31	29	36	53	58	44	35	47	468
Twelfth	6	7	9	13	9	3	8	6	3	7	10	9	90
Thirteenth	13	9	9	20	10	9	12	9	11	12	11	12	137
Fourteenth	3	5	7	6	6	2	1	2	4	4	8	7	55
Fifteenth	6	17	9	13	13	8	12	8	11	10	7	9	123
Public Institutions and Places.	6	5	3	7	6	3	4	3	4	....	5	3	49
Total	192	187	192	260	246	192	214	248	234	216	218	279	2678

MORTALITY OF CHILDREN UNDER 5 YEARS OF AGE, BY SANITARY DIVISIONS AND MONTHS: 1906.

TOTAL DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	4	7	6	7	6	3	3	7	6	5	5	10	69
Second	18	17	16	13	10	12	7	12	10	14	7	16	152
Third	25	20	23	25	19	20	26	30	21	16	24	19	268
Fourth	45	54	51	52	60	57	69	79	81	57	60	57	722
Fifth	213	206	217	249	281	178	301	389	296	247	212	251	3040
Sixth	38	35	35	41	37	31	42	55	45	35	34	72	500
Seventh	10	9	6	11	4	5	12	3	7	10	5	11	93
Eighth	43	25	40	50	47	23	22	35	32	25	24	41	407
Ninth	....	1	1	1	....	1	....	....	2	1	..	3	10
Tenth	4	6	6	2	5	7	9	4	3	3	3	13	65
Eleventh	109	94	124	113	108	85	147	195	161	131	106	143	1516
Twelfth	31	35	30	39	25	18	32	25	28	28	34	35	360
Thirteenth	38	43	49	45	36	37	33	45	47	41	35	40	489
Fourteenth	22	19	22	21	14	8	12	22	18	12	23	14	207
Fifteenth	35	48	36	39	39	26	52	47	34	33	33	40	462
Public Institutions and Places	41	21	35	46	52	26	32	48	32	39	26	34	432
Total	676	640	697	754	743	537	799	996	823	697	631	799	8792
Premature and Still-births	154	195	186	217	194	196	189	151	216	160	231	186	2275

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DEATHS FROM CONSUMPTION, BY SANITARY DIVISIONS AND MONTHS: 1906.

CONSUMPTION DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	3	2	3	4	2	1	1	3	3	4	1	....	27
Second	8	8	6	4	8	2	4	2	3	6	10	3	64
Third	13	3	11	8	16	6	16	9	6	16	11	7	122
Fourth	16	19	15	21	32	16	21	23	20	23	28	31	265
Fifth	87	71	87	109	79	70	65	85	78	63	70	79	943
Sixth	15	10	22	26	26	14	17	13	21	24	22	19	229
Seventh	5	5	1	3	2	6	4	2	5	3	4	3	43
Eighth	17	20	23	25	17	14	20	17	16	16	12	22	219
Ninth	3	5	6	5	3	4	3	3	1	4	....	....	37
Tenth	2	1	4	2	4	....	....	3	1	3	2	4	26
Eleventh	69	51	60	60	47	40	55	43	47	44	48	39	603
Twelfth	23	17	18	23	21	13	18	14	19	23	13	19	221
Thirteenth	11	11	23	21	14	6	9	15	13	10	16	18	167
Fourteenth	5	5	....	3	1	7	3	....	4	7	1	....	36
Fifteenth	10	5	8	9	9	5	8	3	4	9	3	5	78
Public Institutions and Places.	15	6	17	12	15	11	10	13	11	6	13	15	144
Total	302	239	304	335	296	215	254	248	252	261	254	264	3224

DEATHS FROM ALL TUBERCULOSIS (INCLUDING PULMONARY TUBERCULOSIS), BY SANITARY DIVISIONS AND MONTHS: 1906.

ALL TUBERCULOSIS DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	5	2	4	5	2	2	3	3	3	5	1	....	35
Second	9	9	6	8	8	4	7	12	3	8	11	4	79
Third	14	3	15	11	18	8	19	13	10	17	14	9	151
Fourth	21	25	20	31	41	23	25	32	26	26	31	35	336
Fifth	97	79	95	121	95	80	80	103	87	74	81	92	1084
Sixth	16	11	26	28	33	18	18	15	23	25	25	21	259
Seventh	7	5	1	4	4	7	4	3	5	3	4	3	50
Eighth	20	27	28	32	22	23	23	22	19	20	15	27	278
Ninth	3	5	7	5	4	4	3	3	1	4	....	1	40
Tenth	3	1	5	4	5	....	2	3	1	4	2	5	35
Eleventh	75	59	64	69	60	46	66	49	53	52	50	42	685
Twelfth	23	21	21	30	28	15	19	21	23	30	16	21	268
Thirteenth	13	16	31	32	19	14	16	17	17	13	18	18	224
Fourteenth	6	5	2	7	1	8	4	2	5	7	1	1	49
Fifteenth	11	5	9	9	10	5	9	3	5	11	4	5	86
Public Institutions and Places.	25	8	22	13	23	13	11	14	12	6	14	17	178
Total	348	281	356	409	373	270	309	305	293	305	287	301	3837

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DEATHS FROM BRONCHITIS, BY SANITARY DIVISIONS AND MONTHS: 1906.

BRONCHITIS DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	....	1	....	2	....	....	1	....	....	....	1	1	6
Second	3	2	....	1	....	....	1	1	1	...	2	1	13
Third	2	1	4	5	3	....	....	1	....	....	2	1	19
Fourth	10	8	5	5	6	2	3	1	3	2	6	8	59
Fifth	15	19	29	41	19	16	12	4	6	14	17	41	243
Sixth	5	2	7	7	5	1	4	4	2	2	3	14	56
Seventh	1	2	1	2	....	....	1	....	....	....	...	1	8
Eighth	4	6	5	5	6	....	1	2	....	2	5	5	41
Ninth	....	....	....	....	....	....	....	....	....	....	....	2	2
Tenth	....	2	....	....	....	1	....	....	....	....	1	1	5
Eleventh	5	8	13	13	15	7	5	11	8	18	10	15	128
Twelfth	4	4	4	3	4	1	2	1	2	2	5	6	38
Thirteenth	4	4	10	4	3	2	1	....	1	4	5	3	41
Fourteenth	1	....	....	....	1	1	....	....	2	....	2	....	7
Fifteenth	6	4	1	3	4	4	3	....	2	1	6	4	43
Public Institutions and Places.	4	1	1	2	1	1	1	2	1	1	....	2	17
Total	64	64	90	98	67	36	35	27	28	46	66	105	726

DEATHS FROM PNEUMONIA, BY SANITARY DIVISIONS AND MONTHS: 1906.

PNEUMONIA DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	3	3	1	1	5	4	3	....	4	4	2	5	35
Second	8	3	4	11	12	5	....	1	3	9	9	10	75
Third	13	12	22	15	11	11	3	2	5	5	14	11	124
Fourth	41	34	31	42	43	18	12	7	9	19	24	48	328
Fifth	140	112	130	184	159	75	40	58	46	64	113	127	1248
Sixth	31	31	26	38	30	12	14	2	10	21	37	45	297
Seventh	7	10	4	6	12	5	4	....	3	4	2	7	64
Eighth	35	28	22	27	41	12	7	4	17	12	20	30	255
Ninth	2	4	....	4	5	2	2	....	....	2	....	1	22
Tenth	5	4	4	2	3	2	1	1	....	....	1	4	27
Eleventh	78	71	88	100	64	52	30	25	26	46	54	81	715
Twelfth	49	29	42	34	31	16	13	8	9	14	23	31	299
Thirteenth	18	25	19	30	19	13	8	7	8	17	27	24	215
Fourteenth	3	7	6	8	3	5	....	1	....	4	9	3	49
Fifteenth	18	20	14	23	16	9	2	3	8	11	6	14	144
Public Institutions and Places.	23	20	8	24	19	5	12	10	3	8	9	9	150
Total	474	413	421	549	473	246	151	129	151	240	350	450	4047

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DEATHS FROM DIARRHEAL DISEASES, BY SANITARY DIVISIONS AND MONTHS: 1906.

DIARRHEAL DISEASES—DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	....	1	1	....	1	....	3	5	2	1	2	1	17
Second	1	2	3	....	1	3	1	6	5	5	3	4	34
Third	7	3	6	2	1	1	11	16	6	8	9	6	76
Fourth	4	8	2	10	9	13	28	48	31	14	11	6	184
Fifth	38	41	38	43	51	31	103	239	187	109	33	39	1012
Sixth	5	10	8	8	5	6	23	36	22	15	8	15	164
Seventh	2	1	....	....	1	1	2	3	5	1	5	2	22
Eighth	6	4	3	9	3	2	7	16	19	8	1	3	81
Ninth	....	....	1	....	....	....	....	....	....	1	....	1	3
Tenth	....	1	2	....	....	1	2	4	2	....	2	4	18
Eleventh	19	13	14	17	20	27	91	123	96	46	15	19	500
Twelfth	5	9	8	9	2	6	15	15	15	11	8	3	106
Thirteenth	6	7	11	6	6	5	12	19	18	13	6	4	113
Fourteenth	7	5	5	3	4	2	5	15	10	5	4	2	67
Fifteenth	4	7	9	8	4	7	29	36	14	11	5	6	140
Public Institutions and Places.	9	4	8	11	16	8	21	27	31	17	11	12	175
Total	113	116	119	126	124	113	413	608	470	265	123	127	2717

DEATHS FROM TYPHOID-FEVER, BY SANITARY DIVISIONS AND MONTHS: 1906.

TYPHOID-FEVER DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	....	....	1	1	....	1	1	....	1	....	1	....	6
Second	1	....	2	1	....	2	....	1	3	2	3	....	15
Third	1	....	....	1	2	1	....	....	....	....	....	2	7
Fourth	2	5	2	5	....	1	4	2	5	4	3	3	36
Fifth	3	2	4	3	7	6	7	7	9	8	9	6	71
Sixth	2	1	3	4	6	3	....	1	2	3	3	....	28
Seventh	1	1	2	....	....	....	1	....	....	....	....	....	5
Eighth	2	1	2	1	1	2	....	3	7	4	5	1	29
Ninth	....	....	....	....	....	....	....	....	....	....	....	2	2
Tenth	....	....	....	....	1	....	....	1	....	....	1	1	4
Eleventh	7	2	3	6	2	5	2	5	11	6	4	6	59
Twelfth	3	3	2	3	1	2	2	1	3	2	3	2	27
Thirteenth	1	1	4	6	2	3	1	3	1	..	3	2	27
Fourteenth	1	....	1	....	2	....	1	1	2	1	....	2	11
Fifteenth	....	2	2	1	4	1	1	1	1	3	2	2	20
Public Institutions and Places.	3	1	....	2	1	2	....	3	4	4	2	1	23
Total	27	19	23	34	29	29	20	29	49	37	39	30	370

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DEATHS FROM SCARLET-FEVER BY SANITARY DIVISIONS AND MONTHS: 1906.

SCARLET-FEVER DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	....	1	2	1	3	2	....	....	1	....	....	....	10
Second	....	....	2	....	....	1	....	1	....	2	....	1	7
Third	2	....	....	1	2	3	....	....	1	....	2	1	12
Fourth	2	1	6	....	6	10	7	4	3	7	16	10	81
Fifth	10	17	8	8	26	29	20	14	13	6	18	18	202
Sixth	....	....	2	23	4	2	1	....	....	2	3	5	22
Seventh	1	1	....	3	1	....	....	....	....	....	....	....	3
Eighth	2	2	5	....	5	3	....	2	1	....	1	2	23
Ninth	....	....	....	....	....	....	....	....	....	....	....	....	....
Tenth	....	....	1	....	....	6	3	....	....	1	....	1	6
Eleventh	3	3	9	7	6	1	5	1	2	5	8	6	61
Twelfth	1	2	4	3	4	1	....	....	2	....	1	2	25
Thirteenth	3	3	1	3	3	....	....	1	....	1	....	1	17
Fourteenth	1	....	1	....	....	....	1	1	....	1	1	4	10
Fifteenth	1	3	1	2	1	....	1	....	1	....	1	....	11
Public Institutions and Places	....	....	2	....	....	....	....	....	....	1	....	....	3
Totals	27	33	44	56	61	58	38	24	24	26	51	51	493

DEATHS FROM DIPHTHERIA, BY SANITARY DIVISIONS AND MONTHS: 1906.

DIPHTHERIA DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Division—													
First	....	1	....	....	....	....	....	....	1	....	....	2	4
Second	2	1	2	....	....	....	2	....	....	1	1	7	16
Third	2	2	3	1	3	2	1	3	3	2	2	4	28
Fourth	2	10	3	3	1	3	3	3	2	6	13	9	58
Fifth	10	6	12	12	9	7	13	7	5	18	26	26	151
Sixth	5	3	3	1	1	3	2	2	...	1	3	6	30
Seventh	....	....	....	....	....	....	....	....	....	2	....	1	3
Eighth	6	2	4	2	5	2	1	3	2	2	7	6	42
Ninth	....	1	....	....	....	1	....	....	....	....	....	....	2
Tenth	....	....	....	1	1	1	....	....	....	1	1	....	5
Eleventh	12	2	7	6	6	1	3	....	7	6	9	10	69
Twelfth	1	2	2	1	1	1	3	3	....	4	4	2	23
Thirteenth	5	....	....	4	2	2	3	2	3	8	9	10	53
Fourteenth	4	1	4	2	3	....	2	....	1	2	1	3	23
Fifteenth	4	4	4	4	1	1	4	....	1	3	3	3	32
Public Institutions and Places	....	3	....	1	....	....	1	....	1	....	1	1	8
Total	53	38	44	38	33	24	38	22	31	56	80	90	547

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DEATHS FROM MEASLES, BY SANITARY DIVISIONS AND MONTHS: 1906.

MEASLES DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	....	....	....	....	....	....	....	....	....	....	....	....	.....
Second	....	....	....	....	....	....	....	....	....	....	....	....	.....
Third	....	....	....	....	....	....	....	....	....	....	....	....	.....
Fourth	....	....	....	3	1	3	2	1	....	....	....	....	10
Fifth	3	3	2	4	13	11	2	....	3	1	5	3	50
Sixth	....	....	....	1	1	1	1	1	....	....	....	1	6
Seventh	....	....	....	....	....	....	....	....	....	....	....	....	.....
Eighth	2	....	....	2	3	....	....	....	....	1	....	....	8
Ninth	....	....	....	....	....	....	....	....	....	....	....	....	.....
Tenth	....	....	1	....	1	....	....	....	....	....	....	....	2
Eleventh	1	1	....	....	2	1	3	1	2	1	2	6	20
Twelfth	....	1	....	....	....	....	....	....	....	....	....	....	1
Thirteenth	....	....	1	3	2	2	1	....	....	....	....	....	9
Fourteenth	....	....	1	2	....	....	....	....	....	....	1	2	6
Fifteenth	....	1	2	1	3	....	....	....	....	....	....	....	7
Public Institutions and Places	....	....	....	....	7	1	....	1	....	....	....	....	9
Total	6	6	7	16	33	19	9	4	5	3	8	12	128

DEATHS FROM WHOOPING COUGH, BY SANITARY DIVISIONS AND MONTHS: 1906.

WHOOPING COUGH DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	....	....	....	....	....	....	....	....	....	....	....	....	.....
Second	....	1	....	....	1	1	....	....	1	....	....	....	4
Third	....	....	1	....	....	....	1	1	2	1	....	1	7
Fourth	....	....	1	3	2	1	1	....	5	1	4	2	20
Fifth	1	2	2	4	5	3	4	3	7	4	3	7	45
Sixth	....	....	....	....	1	1	....	1	2	....	4	1	10
Seventh	....	....	....	....	....	....	1	....	....	....	....	....	1
Eighth	....	....	1	1	1	....	1	1	....	2	....	1	8
Ninth	....	....	....	....	....	....	....	....	....	....	....	....	.....
Tenth	....	....	....	....	2	....	....	....	1	....	....	....	3
Eleventh	1	2	2	2	2	1	2	6	5	3	2	2	30
Twelfth	....	....	1	....	2	....	....	1	1	1	2	....	8
Thirteenth	....	....	1	3	1	....	1	1	2	....	2	....	11
Fourteenth	....	....	....	....	1	1	....	1	2	....	....	1	6
Fifteenth	....	....	....	1	1	2	1	....	2	1	1	....	9
Public Institutions and Places	....	....	....	....	....	1	2	1	....	....	....	1	5
Total	2	5	9	14	19	11	14	16	30	13	18	16	167

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DEATHS FROM BRIGHT'S DISEASE, BY SANITARY DIVISIONS AND MONTHS: 1906.

BRIGHT'S DISEASE DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	6	....	2	2	2	3	3	4	1	2	2	2	29
Second	9	5	3	2	13	10	3	3	8	3	2	5	66
Third	2	4	6	4	8	7	4	9	5	7	10	11	77
Fourth	25	11	20	20	11	22	12	14	18	14	16	21	204
Fifth	51	38	42	44	52	38	40	45	50	44	51	39	534
Sixth	13	17	8	11	18	14	7	17	9	11	10	16	151
Seventh	3	7	....	4	3	3	4	7	2	2	3	7	45
Eighth	19	15	11	11	16	11	24	10	10	16	11	16	170
Ninth	....	3	....	3	2	1	1	1	3	....	1	2	17
Tenth	2	2	2	....	2	....	....	1	1	2	1	3	16
Eleventh	26	27	23	30	27	19	26	29	31	19	23	31	311
Twelfth	24	10	18	27	12	27	12	17	22	21	23	23	236
Thirteenth	10	8	5	21	10	11	9	7	8	10	7	8	114
Fourteenth	2	5	....	2	2	1	1	2	....	....	5	5	25
Fifteenth	2	3	2	4	2	2	5	1	1	4	2	1	29
Public Institutions and Places.	11	9	10	8	6	2	9	12	11	6	7	13	104
Total	205	164	152	193	186	171	160	179	180	161	174	203	2128

DEATHS FROM CANCER, BY SANITARY DIVISIONS AND MONTHS: 1906.

CANCER DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	1	1	3	....	1	1	2	2	2	1	2	1	17
Second	4	4	6	4	6	11	7	4	4	6	12	4	72
Third	5	6	7	7	2	6	5	7	4	3	5	5	62
Fourth	17	10	8	8	11	13	7	12	11	15	7	8	128
Fifth	25	18	15	20	31	21	23	20	20	20	12	25	250
Sixth	12	9	5	4	10	6	8	7	7	4	6	7	86
Seventh	4	1	3	3	2	4	1	4	5	3	6	3	39
Eighth	12	18	13	11	9	12	9	12	11	9	11	9	136
Ninth	1	....	....	1	1	1	....	2	....	1	1	....	8
Tenth	2	....	....	1	....	....	....	....	2	1	1	1	8
Eleventh	13	6	9	13	15	7	8	20	8	9	15	17	140
Twelfth	16	10	13	20	14	9	12	8	13	14	15	10	159
Thirteenth	8	6	5	10	7	1	8	8	4	12	8	11	88
Fourteenth	1	1	1	1	....	1	2	4	3	3	2	3	22
Fifteenth	2	5	...	1	2	3	2	1	2	1	....	3	22
Public Institutions and Places.	7	12	3	12	8	4	10	9	8	4	8	6	91
Total.	131	107	91	116	119	100	104	121	109	106	111	113	1328

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DEATHS FROM DISEASES OF NERVOUS SYSTEM, BY SANITARY DIVISIONS AND MONTHS: 1906.

DISEASES OF NERVOUS SYSTEM DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	3	1	2	1	2	1	1	3	1	....	....	1	16
Second	2	2	7	6	1	4	1	1	1	6	3	7	41
Third	4	6	6	4	3	3	6	3	4	2	6	4	51
Fourth	17	11	12	11	10	8	15	12	11	11	5	8	131
Fifth	46	42	47	34	42	39	38	40	22	32	34	39	455
Sixth	9	5	11	7	6	6	4	6	7	6	9	10	86
Seventh	3	2	2	....	1	3	1	4	2	2	....	1	21
Eighth	9	7	17	11	7	9	8	4	9	9	11	7	108
Ninth	2	....	....	....	....	....	....	....	....	....	....	....	2
Tenth	1	1	....	1	2	3	1	1	1	....	....	4	15
Eleventh	26	26	27	16	20	14	10	20	10	20	26	24	239
Twelfth	12	8	19	18	9	6	10	5	8	11	9	15	130
Thirteenth	11	10	15	8	9	7	3	6	3	9	13	9	103
Fourteenth	2	2	6	5	2	2	2	3	2	4	2	....	32
Fifteenth	7	9	7	5	8	3	5	6	5	6	14	12	87
Public Institutions and Places	7	15	17	10	10	5	5	3	11	13	10	22	128
Total	161	147	195	137	132	113	110	117	97	131	142	163	1645

DEATHS FROM HEART DISEASES, BY SANITARY DIVISIONS AND MONTHS: 1906.

HEART DISEASES DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	3	1	1	1	3	1	....	2	....	2	4	4	22
Second	9	6	10	9	4	8	10	4	5	6	3	5	79
Third	13	5	8	8	8	6	6	2	6	3	8	8	81
Fourth	14	17	17	24	15	16	13	11	14	12	19	13	185
Fifth	31	36	46	51	32	33	39	36	41	43	46	53	487
Sixth	8	12	11	13	10	10	6	8	14	27	18	12	149
Seventh	4	5	10	5	4	1	8	1	4	7	9	7	65
Eighth	20	14	31	13	20	16	13	16	12	21	21	21	218
Ninth	....	2	...	1	1	....	....	2	2	....	1	....	9
Tenth	2	1	2	....	1	....	....	2	1	2	3	1	15
Eleventh	20	16	21	31	16	18	21	17	22	35	33	34	284
Twelfth	18	21	19	22	19	22	23	15	19	21	28	35	262
Thirteenth	14	18	9	22	13	7	14	10	11	20	18	17	173
Fourteenth	4	1	1	2	5	2	3	2	4	4	2	3	33
Fifteenth	5	1	4	4	3	3	2	1	1	6	2	2	34
Public Institutions and Places	3	7	14	9	5	5	11	13	4	6	10	12	99
Total	168	163	204	215	159	148	169	142	160	215	225	227	2195

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DEATHS FROM DISEASES OF EARLY INFANCY, BY SANITARY DIVISIONS AND MONTHS: 1906.

EARLY INFANCY DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	1	4	....	3	1	....	....	1	....	2	1	3	16
Second	8	8	1	6	1	3	2	3	4	5	2	3	46
Third	9	6	1	7	8	5	5	7	5	4	5	2	64
Fourth	10	9	16	8	13	9	18	10	21	17	14	11	156
Fifth	32	28	27	28	36	23	35	46	32	21	31	25	366
Sixth	9	5	6	5	7	9	4	5	7	6	2	8	73
Seventh	4	1	4	7	2	4	6	1	1	5	1	3	39
Eighth	8	9	13	15	11	8	4	8	8	6	8	12	110
Ninth	....	....	....	1	....	1	....	....	....	....	....	....	2
Tenth	2	....	1	....	....	....	1	1	....	3	1	2	11
Eleventh	16	18	24	14	18	8	18	22	19	20	20	20	217
Twelfth	7	12	6	11	6	6	6	3	8	9	11	12	97
Thirteenth	14	13	10	4	7	15	9	14	15	12	6	12	131
Fourteenth	6	....	3	....	2	2	3	5	1	2	3	2	29
Fifteenth	5	5	6	4	7	4	5	4	2	6	7	5	60
Public Institutions and Places	7	11	14	14	14	5	2	13	5	15	9	12	121
Total	139	129	132	127	133	102	118	143	129	133	121	132	1538

DEATHS FROM VIOLENCE (SUICIDE, ACCIDENTS, HOMICIDE AND LEGAL EXECUTIONS COMBINED), BY SANITARY DIVISIONS AND MONTHS: 1906.

VIOLENCE DEATHS IN	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Sanitary Divisions—													
First	....	1	1	3	4	2	1	3	2	....	3	2	21
Second	8	5	1	1	2	2	7	2	2	4	5	1	40
Third	4	4	5	5	7	11	7	4	4	11	5	4	71
Fourth	20	6	6	11	18	12	8	18	16	12	15	14	156
Fifth	37	37	40	45	47	39	50	65	50	48	40	56	554
Sixth	7	10	8	9	12	13	20	16	11	10	13	17	146
Seventh	8	3	1	3	1	8	5	6	9	6	3	7	60
Eighth	11	6	9	9	11	13	13	10	14	10	15	12	132
Ninth	2	....	....	1	2	2	1	2	2	3	....	1	16
Tenth	1	1	....	3	3	1	2	1	2	3	1	3	21
Eleventh	30	21	22	18	31	19	27	26	27	25	18	29	303
Twelfth	7	17	12	12	13	15	16	12	17	13	15	12	160
Thirteenth	12	13	8	13	6	11	7	19	11	9	7	10	126
Fourteenth	2	4	6	4	4	1	3	....	2	2	6	5	39
Fifteenth	11	10	6	5	10	9	13	15	8	7	14	13	121
Public Institutions and Places	21	18	12	28	27	27	28	20	15	24	18	26	264
Total	181	156	137	170	197	184	208	219	202	187	177	212	2230

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Chronological Summary of Chicago Mortality

1857-1906

INCLUSIVE

C. St. Clair Drake, M. D.

Assistant Registrar of Vital Statistics

During the year 1906 the tables of Vital Statistics --the Chronological Summary of the Principal Causes of Mortality in the City of Chicago--have been revised and the causes of death distributed in accordance with modern classification and nomenclature, thus adding greatly to their value.

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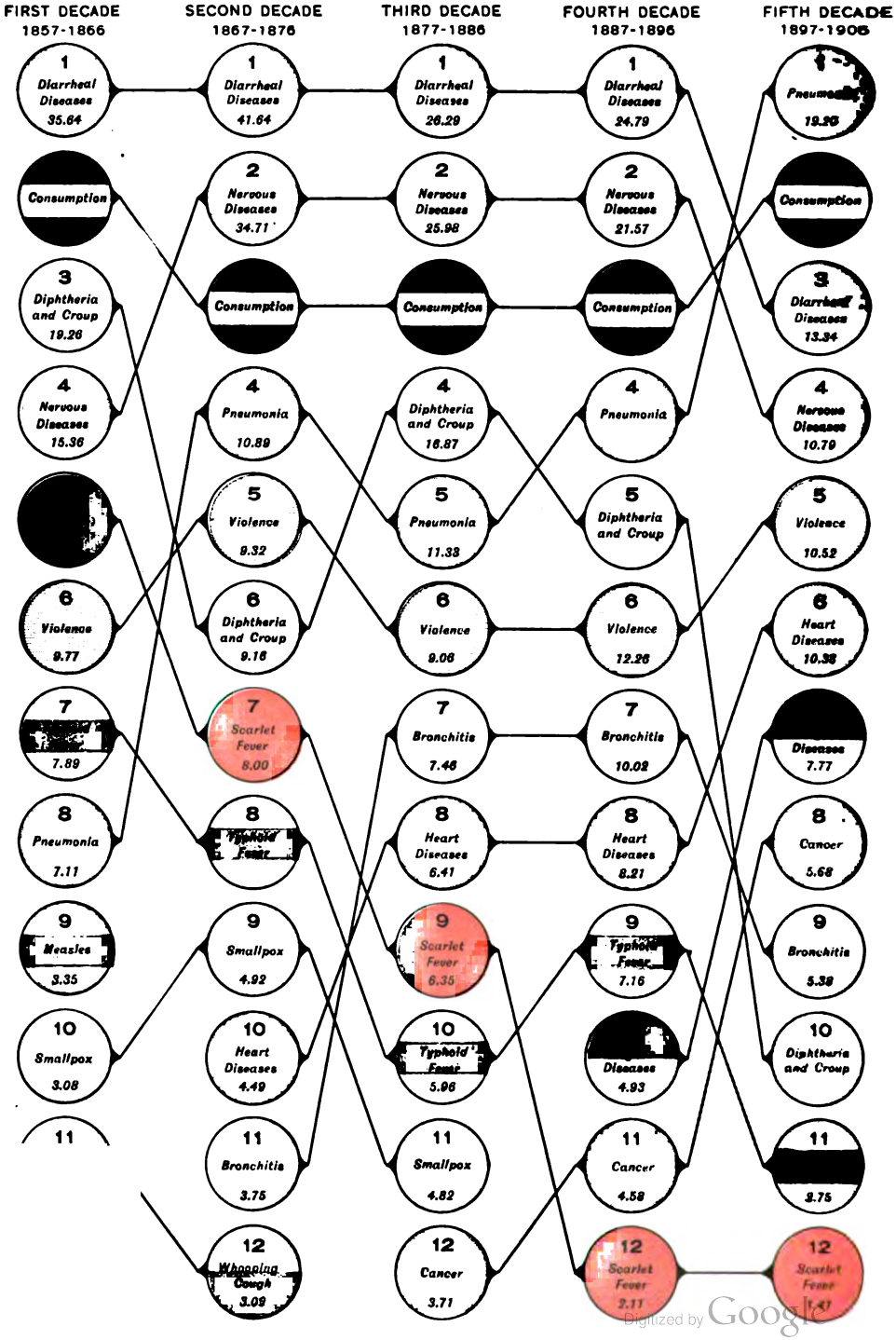
TWELVE CHIEF CAUSES OF DEATH IN EACH DECADE FOR HALF A CENTURY; 1857-1906

In Order of Highest Rates for Each Ten Thousand (10 000) of Population in Each Decade.



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CHRONOLOGICAL SUMMARY OF PRINCIPAL CAUSES OF MORTALITY

IN THE CITY OF CHICAGO: 1857-1906, INCLUSIVE.

THE MORTALITY TABLES ARE ARRANGED IN THE FOLLOWING ALPHABETICAL ORDER:—

ASIATIC CHOLERA.
BRIGHT'S DISEASE.
BRONCHITIS.
CANCER.
CHILD MORTALITY
—UNDER 1 YEAR.
—BETWEEN 1 AND 5 YEARS.
—UNDER 5 YEARS.
CIRCULATORY SYSTEM
—DISEASES OF
CONSUMPTION
——AND ALL TUBERCULOSIS
CROUP.
DIPHTHERIA
——AND ALL CROUP.
DIARRHEAL DISEASES.
DYSENTERY.
ERYSIPELAS.
INFLUENZA.
MALARIAL FEVER.
MEASLES.
NERVOUS DISEASES.
PNEUMONIA.
PUERPERAL FEVER.
SCARLET FEVER.
SMALLPOX.
TYPHOID FEVER.
TYPHUS FEVER.
VIOLENCE.
WHOOPING COUGH.

DEATHS, ALL CAUSES, BY MONTHS: 1857-1905.
DEATH RATES, ALL CAUSES, BY MONTHS: 1857-1906.
POPULATION, DEATHS AND RATES BY YEARS: 1843-1906.
CONDENSED CHRONOLOGICAL SUMMARY OF IMPORTANT CAUSES OF DEATH; OF DEATHS FROM ALL CAUSES; AND OF CERTAIN AGE PERIODS.

ASIATIC CHOLERA.

Deaths as reported by months—Totals by years—Percentages of the mortality from all causes—Deaths per 10000 of population—Annual death rates from all causes—For the years of its occurrence, 1851 to 1873 inclusive.

YEARS.	MONTHS.													ASIATIC CHOLERA MORTALITY.		ANNUAL DEATH RATES FROM ALL CAUSES PER 1000 OF POPULATION.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentages of total mortality.	Per 10 000 of population.	
1851	....	....	....	....	....	2	21	122	67	4	....	....	216	23.30	63.53	27.26
1852	....	....	....	....	7	21	95	235	193	70	9	....	630	34.83	162.65	46.70
1853	....	....	....	....	....	....	1	....	....	....	....	....	1	0.08	0.17	22.41
1854	....	....	....	....	46	170	581	254	174	159	40	....	1424	33.77	216.18	64.02
1855	....	....	....	....	2	....	34	66	44	1	....	....	147	6.74	18.37	27.26
1863	....	....	....	....	....	....	....	3	1	....	....	....	4	0.10	0.27	25.83
1864	....	....	....	....	....	....	1	....	....	....	....	....	1	0.02	0.06	26.26
1866	....	....	....	....	....	....	....	139	166	673	12	....	990	24.57	55.46	32.55
1867	....	....	....	....	....	....	3	5	1	1	....	....	10	0.15	0.50	21.21
1873	....	....	....	....	1	4	22	40	13	....	....	....	80	0.84	2.11	25.15

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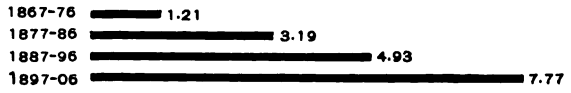
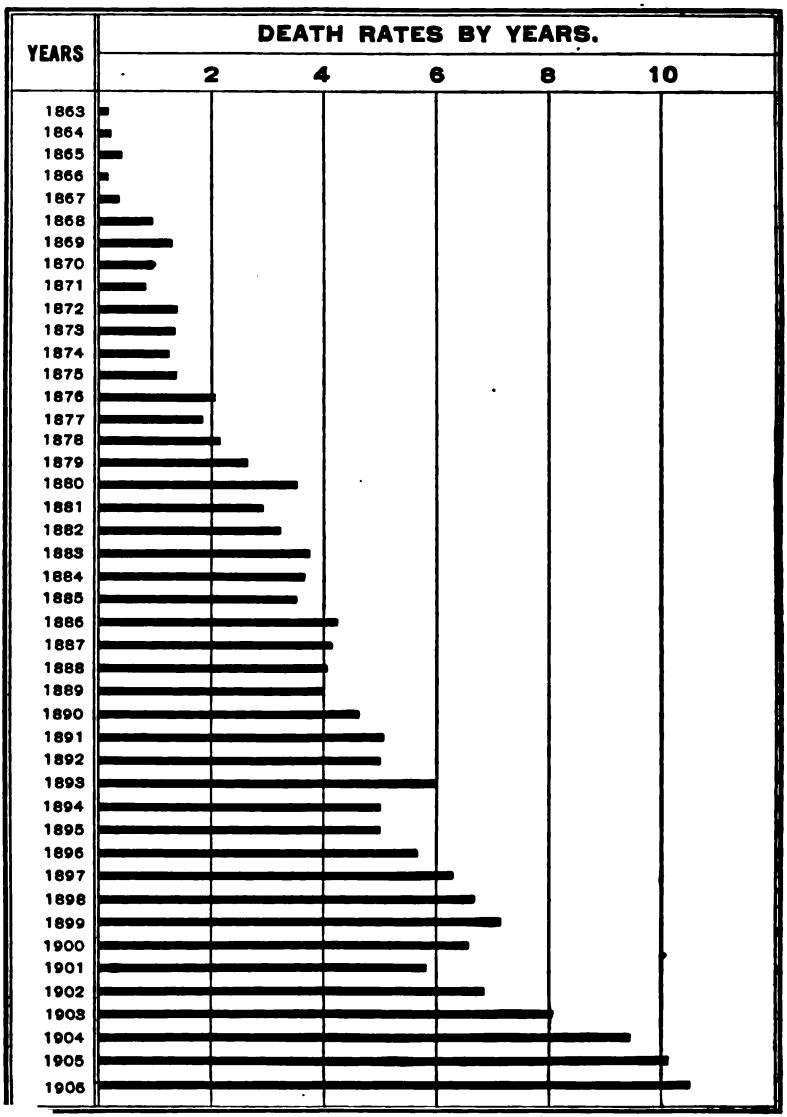
BRIGHT'S DISEASE.

(ACUTE AND CHRONIC NEPHRITIS.)

DEATHS PER 10 000 OF POPULATION.

Average death rates for stated decades.





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BRIGHT'S DISEASE.

(ACUTE AND CHRONIC NEPHRITIS.)

Deaths as reported by months — Totals by years — Percentages of the total mortality from all causes — Death rates per 10 000 of population — Annual death rates from all causes — For the years 1863 to 1906 inclusive.

YEARS.	MONTHS.												BRIGHT'S DISEASE MORTALITY.		
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentages of total mortality.	Per 10 000 of population.	Annual death rates from all causes per 10 000 of population.
1863	....	....	....	....	....	2	....	....	....	....	....	....	2	0.05	0.13	25.83
1864	....	....	....	....	2	....	....	1	....	1	....	....	4	0.09	0.24	26.26
1865	....	1	1	1	....	....	2	....	....	....	1	1	7	0.17	0.39	22.57
1866	....	....	....	1	2	....	....	....	....	....	....	....	3	0.05	0.15	32.55
1867	....	....	....	....	1	1	....	2	....	1	1	2	8	0.17	0.36	21.21
1868	5	2	5	1	3	2	1	....	2	2	3	1	27	0.45	1.07	23.74
1869	1	5	4	2	5	2	4	1	4	5	....	4	37	0.57	1.32	23.17
1870	2	2	6	6	1	2	1	2	1	1	5	1	30	0.41	0.98	23.88
1871	....	6	4	1	1	1	3	....	....	4	2	6	28	0.40	0.84	20.87
1872	6	2	4	1	1	6	9	4	7	9	2	3	54	0.53	1.47	27.64
1873	9	3	6	6	5	1	4	5	3	6	....	4	52	0.54	1.37	25.15
1874	3	6	3	3	8	7	....	3	4	4	3	6	50	0.62	1.26	20.30
1875	3	2	5	3	6	8	3	4	5	3	6	8	56	0.71	1.40	19.72
1876	....	....	....	....	....	....	....	....	....	....	....	....	84	0.98	2.06	21.03
1877	6	9	9	4	5	3	6	5	7	11	8	8	81	1.01	1.88	18.67
1878	12	9	4	2	7	8	12	5	7	6	16	9	97	1.31	2.22	16.99
1879	10	9	12	12	11	8	10	14	12	10	14	9	131	1.52	2.67	17.53
1880	14	12	21	25	18	11	8	20	10	9	15	16	179	1.71	3.56	20.79
1881	11	10	13	14	16	12	17	11	12	10	21	14	161	1.14	2.98	26.11
1882	24	15	15	19	14	10	15	13	11	16	14	18	184	1.39	3.28	23.60
1883	17	21	18	20	23	19	17	16	19	20	17	16	223	1.93	3.84	19.92
1884	23	18	19	15	19	21	30	18	14	14	20	22	233	1.87	3.70	19.80
1885	28	28	20	19	17	17	13	19	17	15	19	23	235	1.88	3.53	18.76
1886	15	20	20	28	32	20	27	31	26	16	27	38	300	2.19	4.26	19.47
1887	31	16	20	22	34	32	28	25	23	30	26	33	320	2.08	4.21	20.27
1888	41	34	19	29	25	27	23	30	24	28	20	30	330	2.09	4.11	19.65
1889	20	28	30	28	43	21	19	23	42	36	50	33	373	2.20	3.99	18.12
1890	39	41	46	31	49	44	36	41	44	42	43	53	509	2.33	4.63	19.87
1891	62	51	63	51	46	64	33	31	51	49	48	45	594	2.14	5.17	24.16
1892	54	52	54	52	52	42	47	55	47	44	53	58	610	2.33	5.08	21.85
1893	64	53	74	51	71	46	64	61	56	78	65	70	753	2.78	6.01	21.61
1894	53	72	59	37	52	53	68	49	47	67	61	52	680	2.85	5.20	18.26
1895	53	70	58	55	61	57	53	56	54	66	54	64	701	2.89	5.13	17.72
1896	64	84	78	74	58	63	67	53	59	73	66	79	818	3.52	5.73	16.29
1897	80	69	73	78	86	94	69	55	74	79	91	89	937	4.30	6.28	14.63
1898	95	87	88	73	116	79	79	81	82	86	85	100	1051	4.61	6.75	14.64
1899	123	87	121	106	114	91	91	72	72	101	109	93	1180	4.63	7.26	15.68
1900	84	92	127	102	95	97	96	73	56	84	103	108	1117	4.48	6.57	14.68
1901	81	85	74	98	81	67	87	77	84	102	86	94	1016	4.16	5.78	13.89
1902	112	102	104	103	111	103	88	87	107	114	95	132	1258	4.76	6.93	14.57
1903	130	136	133	130	139	123	120	93	115	124	130	143	1516	5.24	8.09	15.43
1904	159	166	157	194	150	148	144	125	128	150	152	175	1848	7.02	9.56	13.62
1905	182	134	173	190	179	171	157	152	144	163	187	185	2017	7.41	10.13	13.67
1906	205	164	152	193	186	171	160	179	180	161	174	203	2128	7.33	10.38	14.18

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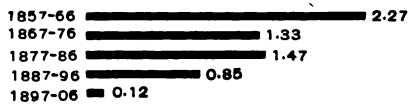
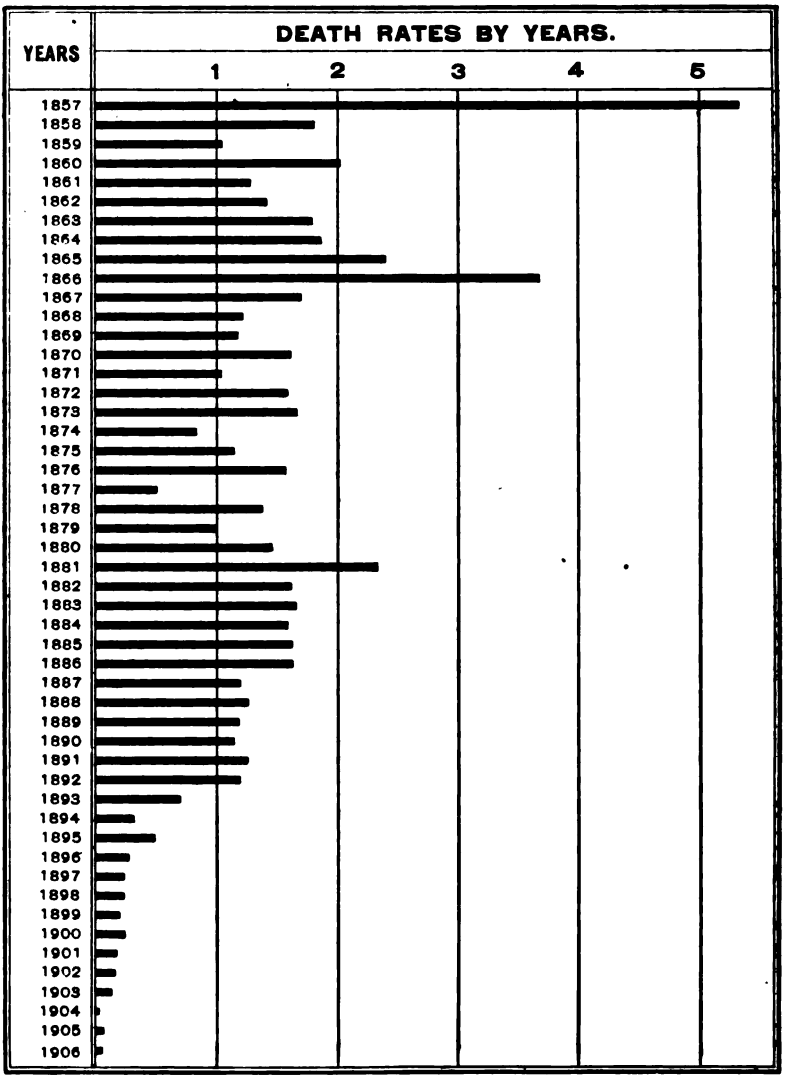
MALARIAL FEVER.

DEATHS PER 10 000 OF POPULATION.

Average death rates for stated decades.





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SMALLPOX.

Deaths as reported by months—Totals by years—Percentages of the mortality from all causes—Deaths per 10 000 of population—Annual death rates from all causes—For the years 1857 to 1906 inclusive.

YEARS.	MONTHS.													SMALLPOX MORTALITY.		Annual death rates from all causes per 1000 of population.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentages of total mortality.	Per 10 000 of population.	
1857	1	....	....	3	1	2	....	2	....	....	1	....	10	0.41	1.14	27.54
1858	1	....	....	1	1	2	....	....	....	....	....	....	5	0.22	0.56	25.06
1859	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	21.59
1860	....	....	....	....	....	1	1	....	....	1	....	....	3	0.13	0.27	20.73
1861	1	1	....	....	....	....	....	....	1	....	2	....	5	0.22	0.42	18.99
1862	1	1	....	....	....	....	....	....	....	....	....	3	5	0.18	0.36	20.52
1863	4	9	8	9	7	11	4	4	7	10	16	26	115	2.97	7.67	25.83
1864	55	40	37	35	32	19	25	8	6	3	11	12	283	6.36	16.71	26.26
1865	8	18	17	4	5	3	....	1	1	....	....	....	57	1.41	3.19	22.57
1866	2	....	....	....	1	....	2	1	1	....	....	2	9	0.14	0.45	32.55
1867	1	5	3	8	3	4	8	11	13	20	19	28	123	2.58	5.47	21.21
1868	39	33	35	12	13	10	2	....	....	....	....	2	146	2.44	5.79	23.74
1869	1	1	2	2	3	2	2	1	3	....	....	....	17	0.26	0.61	23.17
1870	1	1	....	3	2	5	2	1	....	....	....	....	15	0.20	0.49	23.88
1871	2	2	....	1	1	3	3	....	....	1	13	47	73	1.05	2.18	20.87
1872	65	54	97	80	68	60	26	29	20	27	63	66	655	6.45	17.83	27.64
1873	64	53	35	44	56	45	52	31	33	32	36	36	517	5.41	13.61	25.15
1874	24	11	8	17	14	7	7	1	1	....	....	....	90	1.12	2.28	20.30
1875	....	2	3	3	1	1	....	....	....	....	....	....	10	0.13	0.25	19.72
1876	....	....	....	....	....	....	....	....	....	....	....	....	29	0.34	0.71	21.03
1877	....	....	1	3	2	2	4	7	7	4	5	8	43	0.54	1.00	18.67
1878	7	5	2	4	....	....	3	....	....	....	....	....	21	0.28	0.48	16.99
1879	....	....	....	....	....	....	....	....	....	....	....	1	1	0.01	0.02	17.53
1880	....	....	....	9	4	10	3	1	2	3	1	10	43	0.41	0.85	20.79
1881	29	34	31	39	60	37	50	116	116	188	206	274	1180	8.37	21.85	26.11
1882	345	281	262	150	111	49	24	4	5	21	19	21	1292	9.76	23.04	23.60
1883	13	10	9	7	4	3	....	....	....	....	....	....	46	0.40	0.79	19.92
1884	....	....	....	2	....	....	....	....	....	....	....	....	2	0.02	0.03	19.80
1885	....	2	1	....	....	....	....	....	....	1	1	3	8	0.06	0.12	18.76
1886	2	....	....	....	....	....	....	....	....	....	....	....	2	0.01	0.03	19.47
1887	....	....	....	....	....	2	....	....	....	....	....	....	2	0.01	0.03	20.27
1888	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	19.65
1889	....	....	....	....	1	1	....	....	....	....	....	....	2	0.01	0.02	18.12
1890	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	19.87
1891	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	24.16
1892	....	....	....	....	1	1	....	....	....	....	....	....	2	0.01	0.02	21.85
1893	....	1	....	....	....	1	....	1	1	4	2	13	23	0.08	0.18	21.61
1894	29	55	100	157	253	171	51	53	31	40	51	42	1033	4.32	7.89	18.26
1895	56	23	33	14	15	2	3	7	2	....	....	2	157	0.65	1.15	17.72
1896	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	16.29
1897	....	....	1	....	1	....	....	....	....	....	....	....	2	0.01	0.01	14.63
1898	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	14.64
1899	....	....	....	....	....	....	....	....	....	....	1	....	1	.....	0.01	15.68
1900	....	....	....	....	....	1	1	....	....	....	....	....	2	0.01	0.01	14.68
1901	2	....	....	1	1	....	....	....	....	....	....	....	4	0.02	0.02	13.89
1902	1	....	....	....	2	1	....	....	....	....	....	1	5	0.02	0.03	14.57
1903	4	11	8	9	7	2	1	4	1	....	....	....	47	0.16	0 25	15.43
1904	1	....	....	1	....	....	1	....	7	2	9	8	29	0.11	0.15	13.62
1905	7	11	16	4	6	8	5	2	2	....	....	....	61	0.22	0.31	13.67
1906	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	14.18

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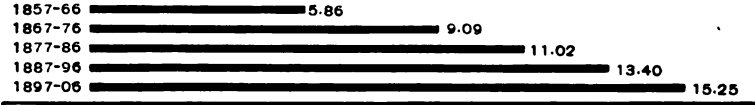
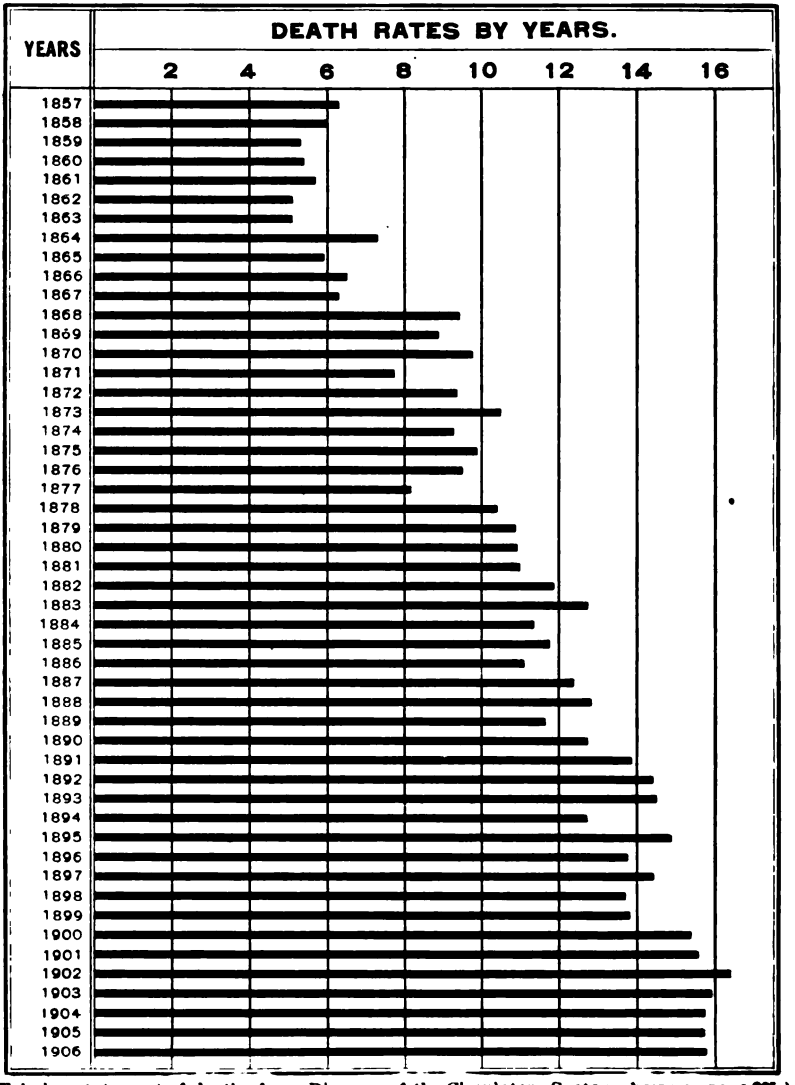
DISEASES OF THE CIRCULATORY SYSTEM.

(INCLUDING HEART DISEASE.)

DEATHS PER 10 000 OF POPULATION.

Average death rates of the stated decades.





(Tabular statement of deaths from Diseases of the Circulatory System shown on page 285.)

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TYPHUS FEVER.

Deaths as reported by months—Totals by years—Percentages of the mortality from all causes—Deaths per 10 000 of population—Annual death rates from all causes—For the years 1851 to 1886 inclusive.

YEARS.	MONTHS.													TYPHUS FEVER MORTALITY.		
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentages of total mortality.	Per 10 000 of population.	Annual death rates from all causes per 1000 of population.
1851	....	....	....	....	....	....	....	2	....	....	1	1	4	0.43	1.18	27.26
1852	....	....	....	....	1	3	1	2	2	....	1	1	11	0.61	2.84	46.70
1853	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	22.41
1854	....	....	....	1	....	1	2	6	6	3	3	....	22	0.52	3.34	64.02
1855	....	....	....	....	....	....	....	1	4	2	....	....	7	0.32	0.87	27.26
1856	....	2	....	....	2	....	1	3	4	10	1	3	26	1.25	3.09	24.80
1857	3	3	4	....	1	3	3	1	3	5	....	4	30	1.24	3.42	27.56
1858	2	2	....	....	....	....	....	1	....	....	1	....	6	0.27	0.67	25.06
1859	....	....	....	....	....	1	....	1	2	1	1	....	6	0.30	0.65	21.59
1860	....	....	....	....	1	1	1	....	....	....	....	....	3	0.13	0.27	20.73
1861	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	18.99
1862	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	20.52
1863	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	25.83
1864	1	6	6	1	....	....	....	....	6	5	2	....	27	0.61	1.59	26.26
1865	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	22.57
1866	....	....	3	2	1	....	1	1	....	1	....	1	10	0.15	0.50	32.55
1867	1	....	2	1	3	3	2	6	4	3	5	2	32	0.67	1.42	21.21
1868	....	....	2	1	1	1	....	....	1	....	....	....	6	0.10	0.24	23.74
1869	....	....	....	....	....	2	1	2	1	....	....	....	6	0.09	0.21	23.17
1870	....	....	....	....	....	....	....	2	1	....	....	....	3	0.04	0.10	23.88
1871	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	20.87
1872	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	27.64
1873	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	25.15
1874	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	20.30
1875	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	19.72
1876	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	21.03
1877	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	18.67
1878	....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	16.99
1879	....	....	....	....	....	....	....	....	....	....	....	1	1	0.01	0.02	17.53
1880	1	4	1	....	2	1	1	1	....	....	....	....	11	0.11	0.22	20.79
1881	1	1	1	....	1	....	....	1	5	2	2	2	16	0.11	0.30	26.11
1882	2	....	....	....	....	2	....	....	1	....	....	....	5	0.04	0.09	23.60
1883	....	....	1	....	....	....	....	....	1	....	....	....	2	0.02	0.03	19.92
1884	1	....	....	....	....	1	....	....	....	1	....	....	3	0.02	0.05	19.80
1885	....	....	....	....	....	....	....	2	3	1	1	....	7	0.06	0.11	18.76
1886	1	1	1	1	....	....	....	....	....	....	....	....	4	0.03	0.06	19.47

NOTE.—There has been no death reported from *Typhus fever* since April, 1886.

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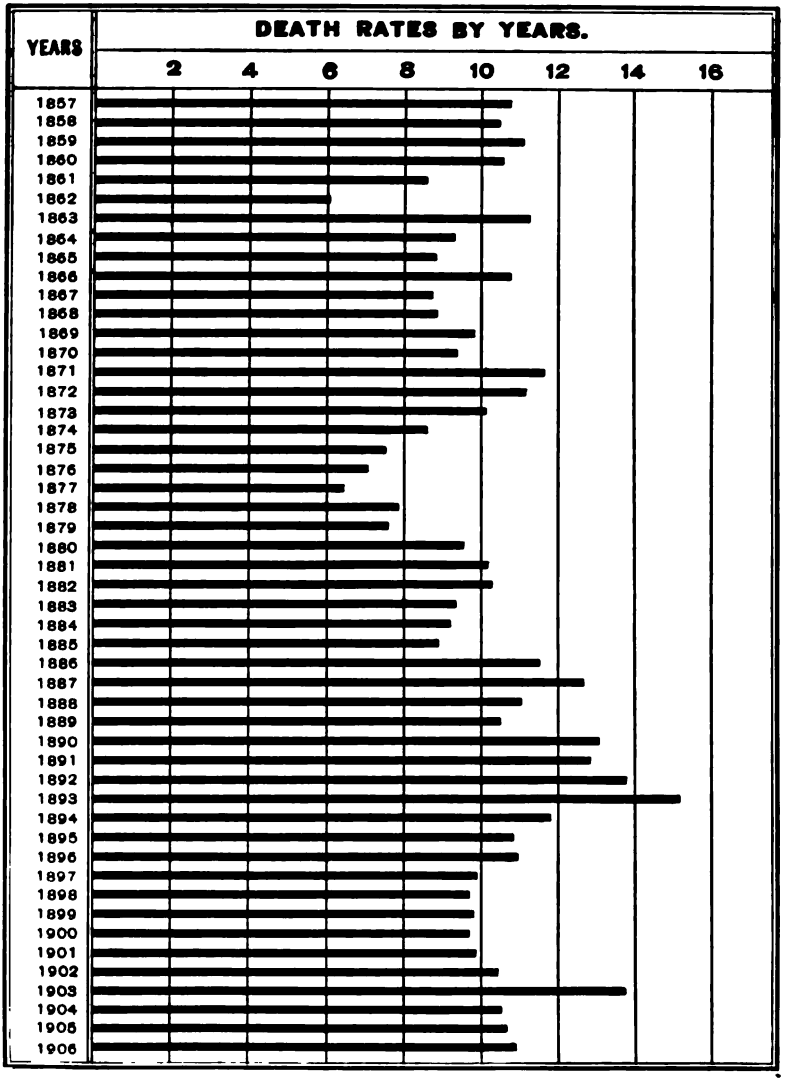
VIOLENCE.

(ALL FORMS.)

DEATHS PER 10 000 OF POPULATION.

Average death rates for stated decades.



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VIOLENCE.

Deaths as reported by years — Percentages of the total mortality from all causes — Death rates per 10 000 of population — Ratio of the various forms of violence to total violence — For the years 1857 to 1906.

YEARS.	ALL VIOLENCE.			ACCIDENTS.							SUICIDE			MANSLAUGHTER.				
	Total Deaths from all Forms of Violence.	Percentages of Total Mortality from All Causes.	Death Rates per 10 000 of Population.	Railway Accidents.	Street Car Accidents.	Sunstroke.	Other Accidents.	Total Accidental Deaths.	Percentages of Accidental Deaths of Total Violence.	Death Rates per 10 000 of Population.	Total Deaths from Suicide.	Percentages of Suicide to Total Violence.	Death Rates per 10 000 of Population.	Homicide.	Legal Execution.	Total Manslaughter.	Percentages of Deaths from Manslaughter of Total Violence.	Death Rates per 10 000 of Population.
1857....	91	3.77	10.39	....	....	1	86	87	95.6	9.93	3	3.3	0.34	1	....	1	1.1	0.11
1858....	94	4.17	10 44	....	....	6	81	87	92.6	9.67	7	7.4	0.78	....	....	....	.....	....
1859....	104	5.18	11.18	....	....	...	91	91	87.5	9.78	13	12.5	1.57	....	....	....	.....	....
1860....	117	5.17	10.71	....	....	2	101	103	88.0	9.43	14	12.0	1.28	....	....	....	.....	....
1861....	102	4 48	8.50	....	....	4	91	95	93.1	7.92	6	5.9	0.50	1	....	1	1.0	0.08
1862....	84	2.96	6.08	....	....	...	84	84	100.0	6.08	....	....	....	....	....	....	.....	....
1863....	169	4.36	11.27	....	....	4	147	151	89.3	10.07	12	7.1	0.80	6	....	6	3.6	0.40
1864....	159	3.57	9.39	....	....	7	133	140	88.1	8.27	9	5.7	0.53	10	....	10	6.3	0.59
1865....	159	3.95	8.91	....	....	4	139	143	89.9	8.01	13	8.2	0.73	3	....	3	1.9	0.17
1866....	217	3.33	10.83	....	....	2	199	201	92.6	10.03	16	7.4	0.80	....	....	....	.....	....
1867....	196	4.11	8.71	....	....	7	169	176	89.8	7.82	20	10.2	0.89	....	....	....	.....	....
1868....	225	3.76	8.93	20	....	24	142	186	82.7	7.38	32	14.2	1.27	7	....	7	3.1	0.28
1869....	277	4 27	9.89	32	....	6	181	219	79.1	7.82	38	13.7	1.36	20	....	20	7.2	0.71
1870....	291	3.97	9.49	31	....	34	174	239	82.1	7.80	44	15.1	1.44	8	....	8	2.7	0.26
1871....	391	5.60	11.70	36	....	1	311	348	89.0	10.41	30	7.7	0.90	13	....	13	3.3	0.39
1872....	410	4.04	11.16	60	....	5	295	360	87.8	9.80	39	9.5	1.06	11	....	11	2.7	0.30
1873....	385	4.03	10.13	78	5	4	224	311	80.8	8.18	55	14.3	1.45	19	....	19	4.9	0.50
1874....	340	4.24	8.60	43	5	11	220	279	82.1	7.06	53	15.6	1.34	8	....	8	2.4	0.20
1875....	301	3.81	7.52	48	3	2	182	235	78.1	5.87	51	16.9	1.27	15	....	15	5.0	0.37
1876....	289	3.37	7.09	36	6	3	188	233	80.6	5.72	41	14.2	1.01	15	....	15	5.2	0.37
1877....	274	3.41	6.37	43	2	1	161	207	75.5	4.81	55	20.1	1.28	12	....	12	4.4	0.28
1878....	348	4.69	7.97	51	....	47	185	283	81.3	6.48	52	14.9	1.19	11	2	13	3.7	0.30
1879....	359	4.17	7.30	68	....	4	217	289	80.5	5.88	56	15.6	1.14	14	....	14	3.9	0.28
1880....	479	4.58	9.52	93	7	31	258	389	81.2	7.73	63	13.2	1.25	27	....	27	5.6	0.54
1881....	548	3.89	10.14	116	6	33	294	449	81.9	8.31	77	14.1	1.43	22	....	22	4.0	0.41
1882....	575	4.34	10.26	103	9	6	333	451	78 4	8.04	88	15.3	1.57	35	1	36	6.3	0.64
1883....	548	4.74	9.45	97	10	10	332	449	81.9	7.74	82	15.0	1.41	17	....	17	3.1	0.29
1884....	581	4.66	9.22	101	11	9	340	461	79.3	7.32	93	16.0	1.48	26	1	27	4.6	0.43
1885....	590	4.73	8.87	91	10	9	343	453	76.8	6.81	98	16.6	1.47	36	3	39	6.6	0.59
1886....	811	5.92	11.52	138	14	6	482	640	78.9	9.09	119	14.7	1.69	51	1	52	6.4	0.74
1887....	964	6.26	12.68	142	12	213	433	800	83.0	10.53	112	11.6	1.47	48	4	52	5.4	0 68
1888....	887	5.62	11.05	192	21	19	437	669	75.4	8.33	152	17.1	1.89	65	1	66	7.4	0.82
1889....	976	5.76	10.44	217	18	7	507	749	76.7	8.01	182	18.6	1.95	45	....	45	4.6	0.48
1890....	1434	6.56	13.04	264	35	152	700	1151	80.3	10.47	206	14.4	1.87	77	....	77	5.4	0.70
1891....	1480	5.33	12.88	301	34	23	823	1181	79.8	10.28	246	16.6	2.14	53	....	53	3.6	0.46
1892....	1660	6.33	13.84	355	39	87	854	1335	80.4	11.13	244	14.7	2.03	81	....	81	4.9	0.68
1893....	1901	7.02	15.17	387	75	22	960	1444	76.0	11.52	353	18.6	2.82	104	....	104	5.5	0.83
1894....	1549	6.48	11 84	256	45	12	880	1193	77.0	9.12	294	19.0	2.25	61	1	62	4.0	0.47
1895....	1480	6.11	10.83	222	52	22	752	1048	70 8	7.67	350	23.6	2.56	81	1	82	5.5	0.60
1896....	1552	6.67	10.87	198	66	185	699	1148	74.0	8.04	331	21.3	2.32	69	4	73	4.7	0.51
1897....	1487	6.82	9.97	186	58	72	699	1015	68.3	6.81	384	25.8	2.58	85	3	88	5.9	0.59
1898....	1516	6.65	9.74	221	62	39	767	1089	71.8	6.99	347	22 9	2.23	77	3	80	5.3	0.51
1899....	1585	6.21	9.75	228	43	31	795	1097	69.2	6.75	377	23.8	2.32	108	3	111	7.0	0.68
1900....	1652	6.62	9.73	258	73	75	788	1194	72.3	7.03	356	21.5	2.10	102	....	102	6.2	0.60
1901....	1750	7.17	9.96	241	85	76	856	1258	71.9	7.16	399	22.8	2.27	92	1	93	5.3	0.53
1902....	1889	7.14	10.41	287	73	9	972	1341	71.0	7.39	439	23.3	2.42	108	1	109	5.8	0.60
1903....	2588	8.95	13.81	316	119	41	1488	1964	75.9	10.48	482	18.6	2.57	142	....	142	5 5	0.76
1904....	2014	7.65	10.42	324	125	24	983	1456	72.3	7.54	423	21.0	2.19	130	5	135	6.7	0.70
1905....	2107	7.74	10.58	319	147	39	986	1491	70.8	7.49	430	20.4	2.16	185	1	186	8.8	0.93
1906....	2230	7.68	10.88	309	167	58	1129	1663	74.5	8.12	400	17.9	1.95	162	5	167	7.5	0 81

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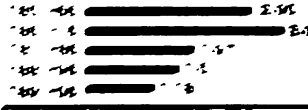
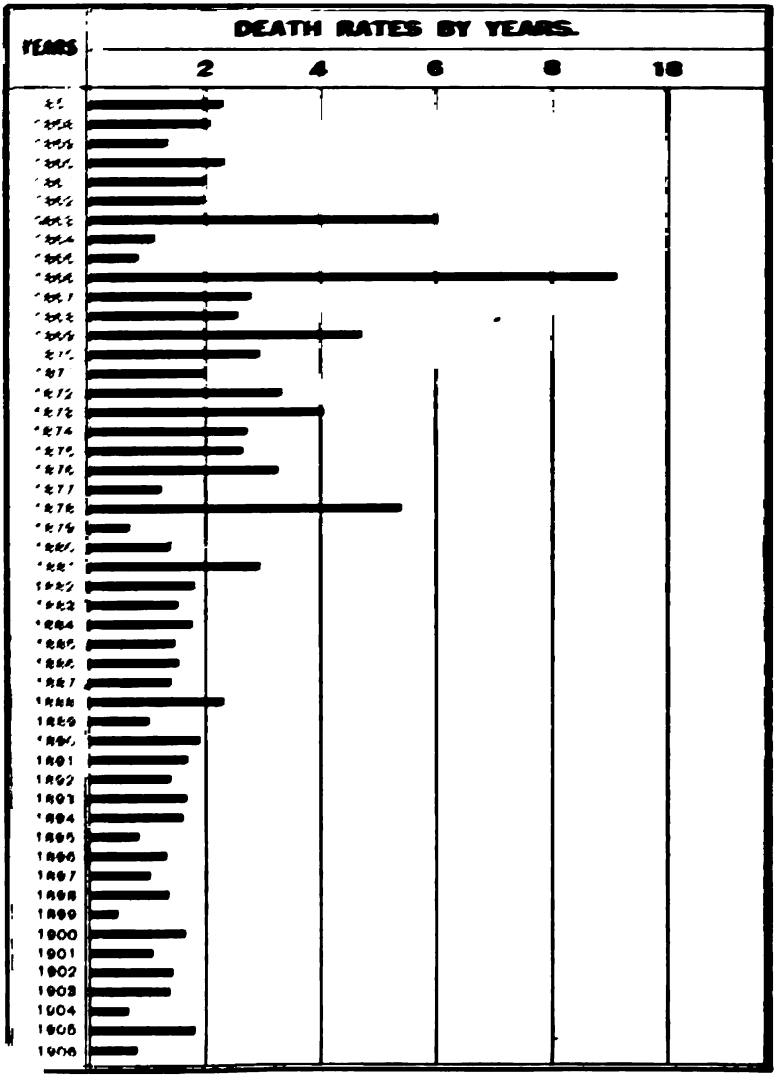
WHOOPING COUGH.

DEATHS PER 10,000 OF POPULATION.

Average death rate of the stated decades.





WHOOPING COUGH

Deaths as reported by months—Totals by years—Percentages of the mortality from all causes—Deaths per 10 000 of population—Annual death rates from all causes—For the years 1857 to 1906 inclusive.

YEARS.	MONTHS.													WHOOPING COUGH MORTALITY.		
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentages of total mortality.	Per 10 000 of population.	Annual death rates from all causes per 1000 of population.
1857	6	7	2	....	1	2	1	1	....	....	....	....	20	0.83	2.28	27.56
1858	....	1	1	....	3	3	1	3	3	1	2	1	19	0.84	2.11	25.06
1859	....	1	1	3	....	1	2	3	1	....	....	....	12	0.60	1.29	21.59
1860	....	1	3	....	1	1	4	9	4	....	1	....	24	1.06	2.20	20.73
1861	....	1	3	2	1	3	10	3	1	....	....	....	24	1.05	2.00	18.99
1862	....	3	4	5	3	....	1	4	2	2	....	3	27	0.95	1.95	20.52
1863	1	3	6	7	10	6	10	14	16	11	3	4	91	2.35	6.07	25.83
1864	1	1	5	2	4	....	....	2	2	1	....	1	19	0.43	1.12	26.26
1865	....	....	2	3	....	....	2	3	2	2	....	1	15	0.37	0.84	22.57
1866	1	2	....	1	3	6	15	63	40	19	17	17	184	2.82	9.18	32.55
1867	10	1	10	4	11	4	4	6	6	2	1	3	62	1.30	2.76	21.21
1868	3	1	1	4	....	6	6	10	9	10	7	6	63	1.05	2.50	23.74
1869	10	10	13	10	13	9	13	25	7	13	5	3	131	2.02	4.68	23.17
1870	4	11	12	6	9	4	13	14	7	5	2	4	91	1.24	2.97	23.88
1871	4	3	5	7	6	8	20	....	....	2	4	4	63	0.90	1.88	20.87
1872	6	4	5	6	3	5	13	41	15	8	10	8	124	1.22	3.38	27.64
1873	5	10	8	12	15	12	23	34	16	10	8	2	155	1.62	4.08	25.15
1874	5	4	6	7	11	13	17	21	14	4	4	1	107	1.33	2.71	20.30
1875	1	2	4	2	4	4	11	21	19	8	13	17	106	1.34	2.65	19.72
1876	....	....	....	....	....	....	....	....	....	....	....	....	133	1.55	3.26	21.03
1877	....	1	1	3	7	4	6	11	4	6	2	7	52	0.65	1.21	18.67
1878	9	14	19	30	32	21	35	28	19	19	5	4	235	3.17	5.38	16.99
1879	....	3	6	....	4	1	4	5	6	....	1	3	33	0.38	0.67	17.53
1880	4	4	10	2	8	6	8	7	7	3	3	6	68	0.65	1.35	20.79
1881	2	8	6	11	17	14	15	32	22	10	8	12	157	1.11	2.91	26.11
1882	6	7	7	9	12	9	15	11	10	8	6	1	101	0.76	1.80	23.60
1883	7	5	10	6	7	9	10	16	12	5	2	3	92	0.80	1.59	19.92
1884	4	5	6	11	9	10	10	11	13	11	11	11	112	0.90	1.78	19.80
1885	7	6	8	6	12	6	14	13	3	8	6	5	94	0.75	1.41	18.76
1886	7	10	10	11	13	4	11	15	18	3	6	4	112	0.82	1.59	19.47
1887	4	2	8	4	7	3	14	19	14	10	11	8	104	0.67	1.37	20.27
1888	21	16	23	22	12	15	21	16	17	9	6	5	183	1.16	2.28	19.65
1889	7	4	9	5	6	8	5	12	18	7	4	11	96	0.57	1.03	18.12
1890	26	18	11	8	12	11	26	31	14	10	15	19	201	0.92	1.83	19.87
1891	16	24	24	15	29	13	20	11	12	11	11	8	194	0.70	1.69	24.16
1892	13	15	13	11	11	14	17	23	18	10	10	9	164	0.63	1.37	21.85
1893	12	5	16	19	18	22	18	38	30	13	10	9	210	0.78	1.68	21.61
1894	16	10	11	14	23	15	24	35	38	8	11	5	210	0.88	1.60	18.26
1895	19	13	8	6	9	5	14	12	13	11	6	6	122	0.50	0.89	17.72
1896	8	5	5	13	22	17	28	24	28	16	10	11	187	0.80	1.31	16.29
1897	9	10	16	25	9	9	21	21	17	10	6	7	160	0.73	1.07	14.63
1898	13	18	25	25	16	20	17	32	18	12	10	2	208	0.91	1.34	14.64
1899	2	3	5	6	4	4	10	14	11	5	6	7	77	0.30	0.47	15.68
1900	16	11	13	19	27	30	33	32	24	25	22	33	285	1.14	1.68	14.68
1901	19	21	23	24	15	21	25	25	21	6	6	1	207	0.85	1.18	13.89
1902	6	16	19	22	23	18	32	43	24	11	18	34	266	1.01	1.47	14.57
1903	39	35	42	40	35	18	18	19	10	3	6	5	270	0.93	1.44	15.43
1904	1	....	2	3	3	12	16	17	8	15	12	24	113	0.43	0.58	13.62
1905	25	30	39	67	60	37	32	25	26	9	5	4	359	1.32	1.80	13.67
1906	2	5	9	14	19	11	14	16	30	13	18	16	167	0.57	0.81	14.18

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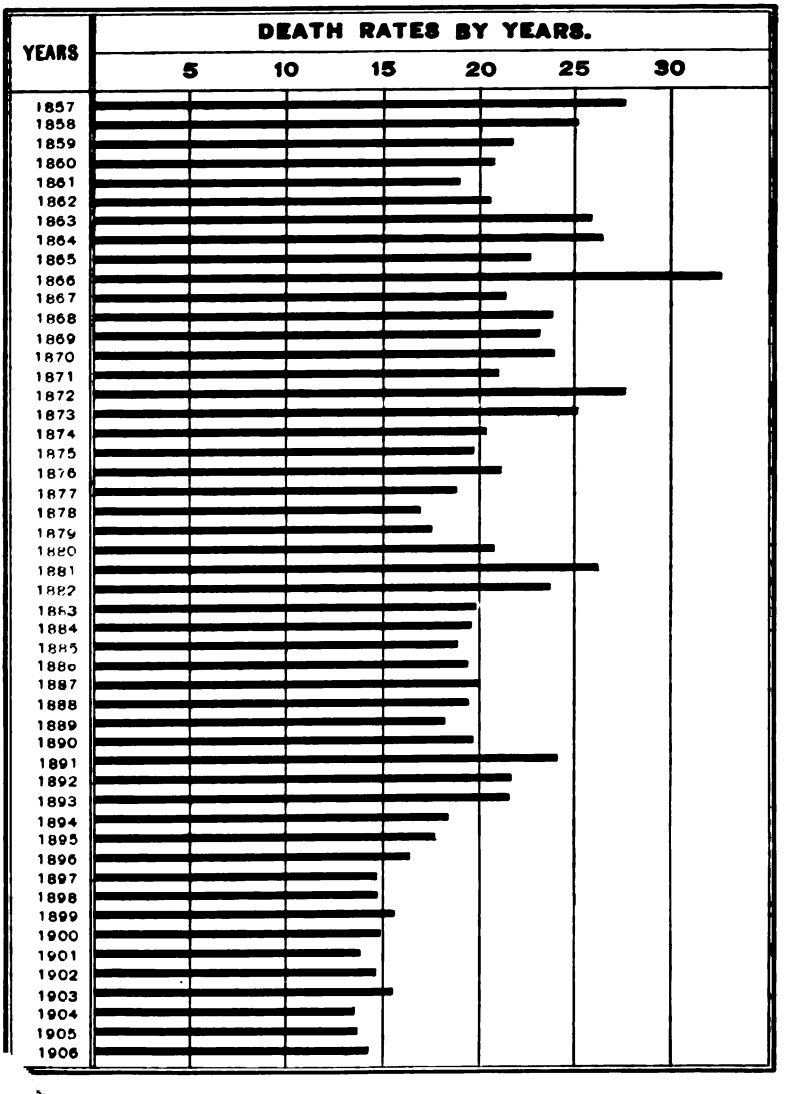
DEATHS FROM ALL CAUSES.

DEATHS PER 1000 OF POPULATION.

Average death rates for stated decades.



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DEATHS FROM ALL CAUSES—1857 TO 1906 INCLUSIVE—BY MONTHS.

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	Death Rate per 1000.
1857	158	126	145	183	137	146	270	392	347	191	165	154	2414	27.56
1858	133	142	172	133	155	155	285	394	255	119	154	159	2255	25.06
1859	147	130	147	170	130	127	179	340	204	175	117	142	2008	21.59
1860	132	145	197	149	119	172	305	325	189	167	188	176	2264	20.73
1861	190	152	189	143	151	148	256	280	245	137	173	215	2279	18.99
1862	196	218	220	208	190	177	296	325	292	267	217	229	2835	20.52
1863	352	323	322	330	280	238	360	371	352	287	289	371	3875	25.83
1864	401	390	378	331	343	295	459	532	436	304	275	304	4448	26.26
1865	248	283	308	275	252	214	467	510	381	396	329	366	4029	22.57
1866	322	285	286	306	303	351	777	1034	813	1287	420	340	6524	32.55
1867	310	266	291	288	251	293	607	707	518	438	384	420	4773	21.21
1868	438	423	381	307	322	305	897	945	741	449	401	375	5984	23.74
1869	384	333	354	381	372	434	815	1072	814	601	489	439	6488	23.17
1870	482	420	535	494	436	720	1118	1033	691	557	422	415	7323	23.88
1871	451	400	470	421	525	558	980	890	694	542	516	529	6976	20.87
1872	567	632	745	756	630	813	1373	1551	989	741	650	709	10156	27.64
1873	711	586	637	611	660	658	1504	1423	1009	644	549	565	9557	25.15
1874	554	472	508	486	509	542	1454	1220	811	576	440	453	8025	20.30
1875	568	449	549	644	603	533	1171	986	764	538	508	586	7899	19.72
1876	578	558	633	575	547	544	1071	1120	790	729	713	715	8573	21.03
1877	739	607	616	629	627	562	1096	868	644	593	522	523	8026	18.67
1878	572	481	578	508	486	453	1067	814	663	587	591	622	7422	16.99
1879	664	533	646	592	555	639	1093	1002	677	699	719	795	8614	17.53
1880	785	747	833	892	770	896	1342	1019	812	768	768	830	10462	20.79
1881	987	838	876	992	1301	998	1822	1730	1211	1101	1069	1176	14101	26.11
1882	1390	1159	1271	1003	1073	1016	1251	1458	1032	824	820	937	13234	23.60
1883	966	859	968	922	910	837	1470	1103	970	840	783	927	11555	19.92
1884	862	792	905	1025	1036	1041	1583	1224	1012	910	956	1125	12471	19.80
1885	1095	946	953	1054	1136	885	1493	1188	1044	869	907	904	12474	18.76
1886	968	999	1222	1253	1021	1095	1415	1352	1145	1043	1077	1109	13699	19.47
1887	1261	1170	1518	1204	1096	1239	2107	1384	1120	1163	1075	1072	15409	20.27
1888	1502	1295	1315	1411	1180	1181	1797	1557	1211	1114	1052	1157	15772	19.65
1889	1255	1072	1260	1159	1240	1032	1958	1703	1601	1583	1504	1579	16946	18.12
1890	2501	2020	2065	1602	1613	1642	2146	2054	1580	1453	1480	1700	21856	19.87
1891	1990	1924	3405	3450	2585	1797	2275	2270	1966	1910	1865	2317	27754	24.16
1892	2279	2275	2129	2093	2016	1900	2832	2540	1984	1822	1804	2045	26219	21.85
1893	2273	2012	2415	2545	2403	1935	2928	2573	2222	1943	1798	2036	27083	21.61
1894	1808	1501	1821	2134	2135	2033	2780	2252	2098	1916	1633	1781	23892	18.26
1895	2088	2352	2127	1984	1885	1773	2439	2039	2015	2020	1726	1771	24219	17.72
1896	2013	1988	1988	2086	1804	1895	2457	2261	1658	1726	1568	1813	23257	16.29
1897	2026	1772	1921	1728	1702	1620	2275	1967	1679	1716	1613	1790	21809	14.63
1898	1835	2023	2316	2133	2022	1581	1938	1977	1780	1607	1732	1849	22793	14.64
1899	2498	2240	2343	2386	2066	1918	2360	2113	1822	1961	1790	2006	25503	15.68
1900	2291	2105	2547	2392	2088	1699	2069	2138	1884	1802	1752	2174	24941	14.68
1901	2240	1933	1958	2116	2046	1805	2263	2169	2070	1829	1811	2166	24406	13.89
1902	2229	2230	2363	2272	2129	1963	2279	2328	2084	1964	2007	2607	26455	14.57
1903	2573	2570	2713	2628	2675	2042	2390	2255	2067	1962	2124	2915	28914	15.43
1904	2374	2709	2613	2482	2222	1747	1960	2112	1957	1894	1902	2339	26311	13.62
1905	2487	2421	2592	2287	2180	1951	2280	2436	2101	2153	2065	2259	27212	13.67
1906	2566	2217	2463	2774	2557	1947	2313	2487	2327	2333	2386	2678	29048	14.18

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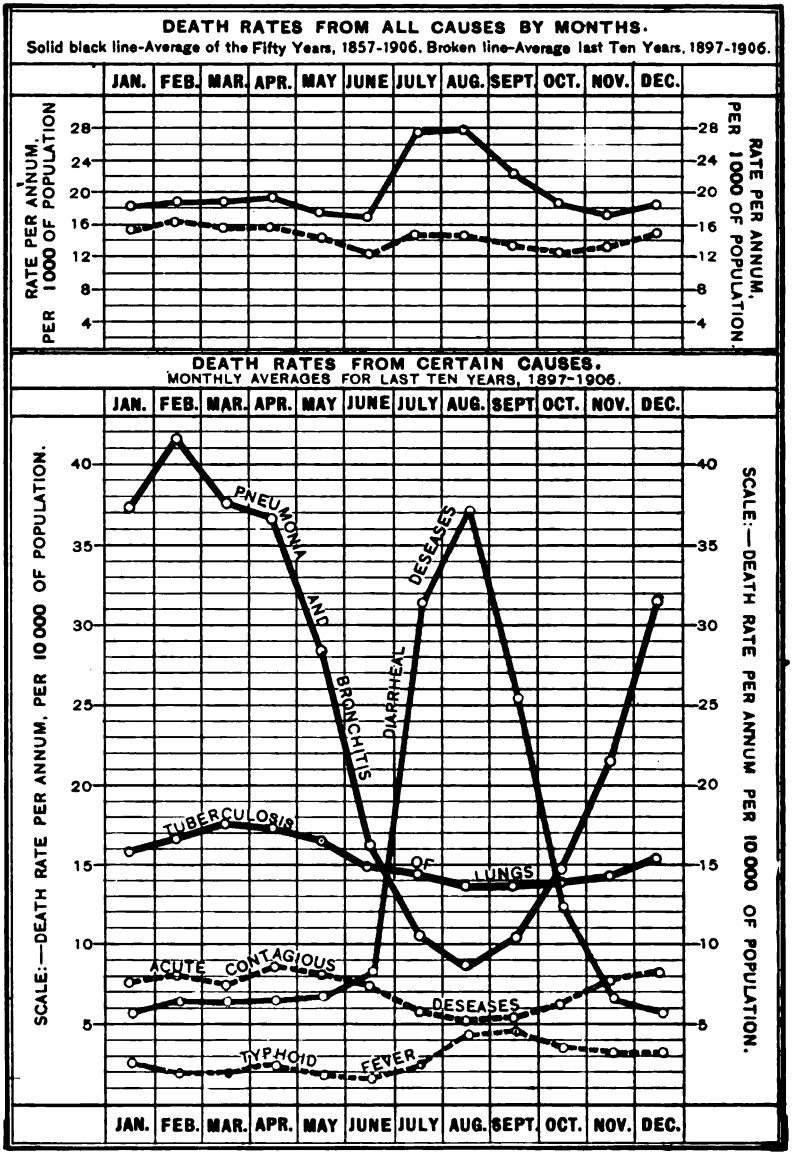
DEATH RATES FROM ALL CAUSES BY MONTHS.
Solid black line-Average of the Fifty Years, 1857-1906. Broken line-Average last Ten Years, 1897-1906.
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
RATE PER ANNUM, PER 1000 OF POPULATION
28 24 20 16 12 8 4
DEATH RATES FROM CERTAIN CAUSES.
MONTHLY AVERAGES FOR LAST TEN YEARS, 1897-1906.
SCALE:—DEATH RATE PER ANNUM, PER 10 000 OF POPULATION.
40 35 30 25 20 15 10 5
PNEUMONIA AND BRONCHITIS
DIARRHEAL DESEASES
TUBERCULOSIS OF LUNGS
ACUTE CONTAGIOUS DESEASES
TYPHOID FEVER

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ALL CAUSES.

Death rates, by months, per 1000 of population, per annum, 1857-1906.

YEARS.	MONTHS.												Yearly rate per 1000 of population.
	January.	February.	March.	April.	May.	June.	July.	August	September.	October.	November.	December.	
1857....	21.38	18.75	19.45	25.42	18.42	20.25	36.29	52.67	48.17	25.67	22.92	20.67	27.56
1858....	17.40	20.56	22.51	17.97	20.28	20.97	37.27	51.55	34.47	15.57	20.81	20.81	25.06
1859....	18.60	18.21	18.60	22.21	16.44	16.60	22.64	43.02	26.69	22.14	15.31	17.98	21.59
1860....	14.24	16.76	21.30	16.62	12.87	19.20	32.94	35.12	21.11	18.03	20.98	19.00	20.73
1861....	18.65	16.52	18.55	14.51	14.81	15.00	25.12	27.47	24.85	13.44	17.55	21.08	18.99
1862....	16.69	20.55	18.75	18.30	16.19	15.58	25.23	27.68	25.70	22.74	19.10	19.52	20.52
1863....	27.62	28.06	25.28	26.77	21.97	19.30	28.25	29.13	28.54	22.53	23.43	29.13	25.83
1864....	27.94	29.05	26.34	23.84	23.90	21.24	31.99	37.09	31.40	21.17	19.80	21.18	26.26
1865....	16.36	20.67	20.35	18.75	16.63	14.58	30.80	33.64	25.97	26.11	22.43	24.15	22.57
1866....	18.92	18.54	16.80	18.58	17.79	21.31	45.64	60.74	49.35	75.62	25.50	19.98	32.55
1867....	16.22	15.41	15.23	15.57	13.13	15.85	31.76	37.00	28.02	22.92	20.76	21.98	21.21
1868....	20.52	21.17	17.85	14.85	15.07	14.75	42.01	44.26	35.87	21.03	19.40	17.56	23.74
1869....	16.14	15.50	14.89	16.56	15.64	18.85	33.33	45.18	35.37	25.26	21.25	18.46	23.17
1870....	18.50	17.86	20.54	19.59	16.74	16.67	42.93	39.67	27.42	21.38	16.74	15.93	23.88
1871....	15.88	15.59	16.55	15.32	18.49	20.31	34.52	31.35	25.22	19.09	18.78	18.63	20.87
1872....	18.22	21.71	23.94	25.10	20.22	27.00	44.12	49.84	32.83	23.81	21.58	22.79	27.64
1873....	22.02	20.09	19.72	39.56	20.45	21.06	46.60	44.09	32.30	19.95	17.58	17.50	25.15
1874....	16.50	15.56	15.13	14.95	15.16	16.68	43.29	36.32	24.95	17.15	13.54	13.49	20.30
1875....	16.70	14.61	16.14	19.56	17.70	16.19	34.42	28.98	23.20	15.81	15.43	17.22	19.72
1876....	16.70	17.27	18.31	17.15	15.80	16.25	30.97	32.41	23.61	21.10	21.28	20.65	21.03
1877....	20.20	18.42	16.87	17.74	17.15	15.87	29.97	23.77	18.17	16.21	14.77	14.26	18.67
1878....	15.38	14.36	15.52	14.12	13.12	12.62	28.75	21.12	18.47	15.79	16.01	17.22	16.99
1879....	15.67	14.11	15.45	14.78	13.29	15.82	26.14	23.99	16.71	16.71	17.75	19.01	17.53
1880....	18.40	18.74	19.49	21.60	18.04	21.67	31.49	23.71	19.64	18.03	18.61	19.42	20.79
1881....	21.49	20.21	19.06	22.31	28.32	22.44	39.68	37.72	27.24	24.00	24.06	25.62	26.11
1882....	29.16	26.95	26.69	21.74	22.52	22.00	26.23	30.60	22.39	17.32	17.77	19.66	23.60
1883....	19.57	19.32	19.63	19.32	18.44	17.55	29.83	22.37	20.33	17.05	16.43	19.66	19.92
1884....	16.15	15.86	16.97	19.81	19.41	20.16	29.63	22.95	19.58	17.02	18.48	21.09	19.80
1885....	19.38	18.55	16.85	19.26	20.09	16.19	26.40	21.02	19.10	15.37	16.58	15.97	18.76
1886....	16.18	18.51	20.44	21.63	17.06	18.93	23.65	22.61	19.76	17.43	18.52	18.52	19.47
1887....	19.55	20.08	23.48	19.26	16.95	19.83	32.61	21.42	17.78	18.01	17.19	16.62	20.27
1888....	22.09	20.36	19.34	21.45	17.35	17.95	26.43	22.90	18.41	16.39	15.99	17.02	19.65
1889....	15.81	14.95	15.85	14.87	14.54	13.43	24.63	21.43	20.92	19.90	19.56	19.87	18.12
1890....	26.78	23.93	22.10	17.72	17.26	18.15	22.96	21.97	17.42	15.56	16.36	18.19	19.87
1891....	20.40	21.83	34.89	36.54	26.50	19.03	23.32	23.26	20.81	19.57	19.73	23.73	24.16
1892....	22.42	23.92	20.96	21.26	19.83	19.31	28.30	24.98	20.17	17.94	18.33	20.10	21.85
1893....	21.35	20.91	22.69	24.70	22.58	18.79	27.50	24.18	21.56	18.26	17.45	19.14	21.61
1894....	16.26	14.95	16.37	19.83	19.22	18.88	25.01	20.25	19.49	17.24	15.17	16.01	18.26
1895....	18.00	22.43	18.32	17.65	16.23	15.78	20.99	17.57	17.92	17.38	15.35	15.25	17.72
1896....	16.64	17.57	16.43	17.82	14.92	16.20	20.32	18.69	14.17	14.28	13.40	15 00	16.29
1897....	15.98	15.50	15.17	14.10	13.44	13.22	17.97	15.52	13.70	13.54	13.15	14.13	14.63
1898....	13.88	16.92	17.51	16.66	15.28	12.35	14.65	14.95	13.90	12.14	13.52	13.96	14.64
1899....	18.09	17.95	16.97	17.84	14.95	14.34	17.08	15.31	13.62	14.18	13.39	14.52	15.68
1900....	15.88	16.16	17.65	17.13	14.46	12.17	14.34	14.83	13.50	12.49	12.53	15.06	14.68
1901....	15.00	14.33	13.11	14.64	13.71	12.47	15.16	14.53	14.33	12.25	12.58	14.51	13.86
1902....	14.45	16.00	15.32	15.22	13.81	13.15	14.77	15.09	13.95	12.72	13.45	16.91	14.57
1903....	16.16	17.92	17.04	17.06	16.81	13.26	15.02	14.16	13.42	12.33	13.78	18.31	15.43
1904....	14.47	17.66	15.93	15.65	13 60	11.02	11.95	12.93	12.33	11.58	11.99	14.30	13.62
1905....	14.70	15.86	15.28	13.98	12.88	11.92	13.48	14.41	12.83	12.73	12.61	13.36	13.67
1906....	14.74	14.10	14.15	16.45	14.71	11.56	13.29	14.29	13.81	13.40	14.17	15.39	14.18

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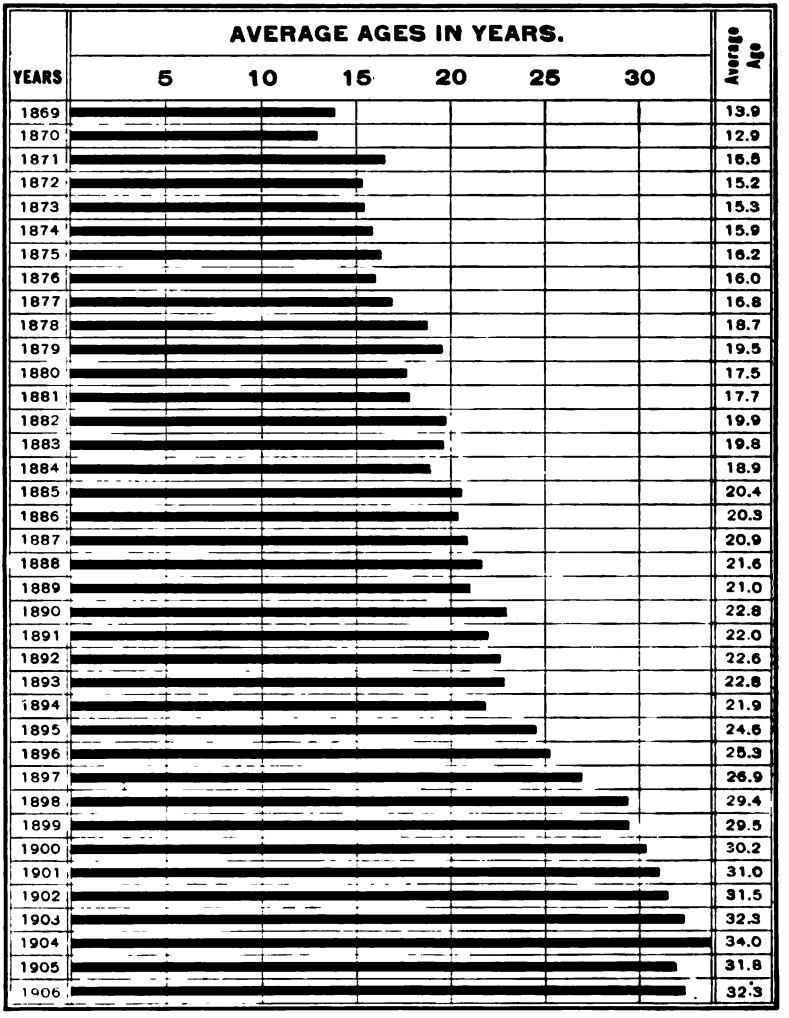
INCREASING DURATION OF LIFE IN CHICAGO.

I. Average Age of Each Individual Dying in the Years 1869 and in 1906.

Increase in thirty-seven years, 129 per cent.

II. Average Ages of 627 806 Individuals who Died During the Last 37 Years.



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CHICAGO POPULATION, DEATHS AND DEATH RATES, BY YEARS: 1843–1906, INCLUSIVE.

YEARS.	Population.	Number of deaths.	Number of deaths in 1000 of population.
1843	7 580	141	18.60
1844	10 170	336	33.04
1845	12 088	344	28.46
1846	14 169	394	27.81
1847	16 859	572	33.93
1848	20 023	638	31.86
1849	23 047	1 701	73.80
1850	29 963	1 467	48.96
1851	34 000	927	27.26
1852	38 734	1 809	46.70
1853	59 130	1 325	22.41
1854	65 872	4 217	64.02
1855	80 023	2 181	27.26
1856	84 113	2 086	24.80
1857	87 600	2 414	27.56
1858	90 000	2 255	25.06
1859	93 000	2 008	21.59
1860	109 206	2 264	20.73
1861	120 000	2 279	18.99
1862	138 186	2 835	20.52
1863	150 000	3 875	25.83
1864	169 353	4 448	26.26
1865	178 492	4 029	22.57
1866	200 418	6 524	32.55
1867	225 000	4 773	21.21
1868	252 054	5 984	23.74
1869	280 000	6 488	23.17
1870	306 605	7 323	23.88
1871	334 270	6 976	20.87
1872	367 396	10 156	27.64
1873	380 000	9 557	25.15
1874	395 408	8 025	20.30
1875	400 500	7 899	19.72
1876	407 661	8 573	21.03
1877	430 000	8 026	18.67
1878	436 731	7 422	16.99
1879	491 516	8 614	17.53
1880	503 185	10 462	20.79
1881	540 000	14 101	26.11
1882	560 693	13 234	23.60
1883	580 000	11 555	19.92
1884	629 885	12 471	19.80
1885	665 000	12 474	18.76
1886	703 715	13 699	19.47
1887	760 000	15 409	20.27
1888	802 651	15 772	19.65
1889	935 000	16 946	18.12
1890	1 099 850	21 856	19.87
1891	1 148 795	27 754	24.16
1892	1 199 730	26 219	21.85
1893	1 253 022	27 083	21.61
1894	1 308 682	23 892	18.26
1895	1 366 813	24 219	17.72
1896	1 427 527	23 257	16.29
1897	1 490 937	21 809	14.63
1898	1 557 164	22 793	14.64
1899	1 628 333	25 503	15.68
1900	1 698 575	24 941	14.68
1901	1 757 010	24 406	13.89
1902	1 815 445	26 455	14.57
1903	1 873 880	28 914	15.43
1904	1 932 315	26 311	13.62
1905	1 990 750	27 212	13.67
1906	2 049 185	29 048	14 18

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CONDENSED CHRONOLOGICAL SUMMARY OF IMPORTANT CAUSES OF DEATH.

Deaths per 10 000 of population — Average rates by decades — Average rate for fifty-year period, 1857–1906.

Years.	Bright's Disease.	Bronchitis.	Cancer.	Consumption	All Tuberculosis.	Croup.	Diphtheria.	Diphtheria and Croup.	Diarrheal diseases.	Dysentery.	Erysipelas.	Influenza.
1857	.....	0.11	.....	29.11	30.37	18.49	0.23	18.72	64.84	53.08	0.68	.....
1858	.....	0.11	0.44	37.11	39.22	20.89	0.22	21.11	36.56	24.89	0.44	.....
1859	.....	.....	0.54	27 53	29.14	17.31	0.86	18.17	30.65	11.83	0.43	.....
1860	.....	.....	0.46	25.27	26.28	11.45	14.10	25.55	26.92	9.25	0.37	.....
1861	.....	.....	0.58	26.67	27.92	10.33	9.33	19.67	25.17	4.75	0.25	.....
1862	.....	0.07	0 22	25.18	26.20	7.31	5.36	12.66	24.10	4.70	0.36	.....
1863	0.13	0.13	0.60	18.87	19.87	11.80	9 13	20.93	20.33	2.93	1.20	0.07
1864	0.24	0.18	0 65	24.21	25.80	10.62	7.20	17.83	43.46	7.03	2 00	.....
1865	0.39	0.06	0.90	19.05	20.28	14.06	9.47	23.53	34.01	4.76	1.12	0.06
1866	0.15	0.45	1.80	20.26	21 51	7.43	7.04	14.47	50.34	4.94	1.05	.....
*Average	† 0.09	0.11	0.62	25.33	26.66	12.97	6.29	19.26	35.64	12 82	0.79	† 0.03
1867	0.36	1.07	2.00	17.96	24.04	4.36	3.56	7.91	38.66	3.51	0.67	.....
1868	1.07	3.02	3.25	16.74	24.84	4.01	3.73	7.74	51.21	6.07	0.87	.....
1869	1.32	2.25	2.25	17.96	26.93	4.14	5.04	9.18	46.54	5.25	1.18	.....
1870	0.98	4.11	2.84	17.64	28.15	8.15	5.77	13.93	21.27	5.06	0.98	.....
1871	0 84	3.11	2.03	14.96	24.80	4.16	3.20	7.36	34 28	3.89	0.99	.....
1872	1.47	4 84	2.04	19.33	27.46	4.38	5.33	9.72	54.23	4.65	1.66	0.05
1873	1.37	5.66	2.82	16.82	24.47	2.74	3.47	6.21	54.74	4.53	1.74	0.05
1874	1.26	3.89	2.76	15.93	21.85	1.69	2.71	4.40	49.04	2.00	1.29	0.08
1875	1.40	4.87	3.05	17.33	21.97	2.95	3.77	6.72	37.58	2.40	0.92	0.07
1876	2.06	4.64	2.99	17.96	21.73	6.77	11.68	18.45	28.80	1.55	0.81	.....
*Average	1.21	3.75	2.60	17.26	24.62	4.34	4.83	9.16	41.64	3.89	1.11	0.03
1877	1.88	4.23	3.02	17.05	21.23	4 42	9.16	13.58	24.72	1.63	0.86	.....
1878	2.22	6 62	4.05	15.96	19.60	5.13	6 89	12.02	19.90	0.80	0.92	.....
1879	2.67	4.72	3.60	15.16	17.37	7.41	12.29	19.69	21.64	1.08	0.98	.....
1880	3.56	6 92	3.24	17.39	19.50	10.59	18.48	29.07	24.17	1.03	0.97	0.02
1881	2.98	8.00	4.02	19.61	22.06	7.41	11.28	18.69	37.48	1.17	1.26	.....
1882	3.28	8.95	3.92	18.81	21.10	4.14	9.29	13.43	27.84	1.41	0.91	.....
1883	3.84	7.64	4.00	17.84	19.83	3.88	10.21	14.09	27.00	1.31	1.00	.....
1884	3.70	8.72	4.21	16.43	18.81	4.06	10.30	14.37	30.70	1.22	0.89	.....
1885	3.53	8.38	3.74	17.76	19.38	4.60	10.62	15.22	25.46	3.34	0.74	.....
1886	4.26	10.37	3.27	17 48	19.57	5.10	13.41	18.52	24.03	3.33	0.82	.....
*Average	3.19	7.46	3.71	17.35	19.85	5.67	11.19	16.87	26.29	1.63	0.94	.....
1887	4.21	9.92	3.96	18.07	20.26	5.30	13.18	18 49	26.86	4.03	0.91	.....
1888	4.11	10.25	4.50	18.21	20.13	5.47	10.69	16.16	25.33	3 65	1.07	.....
1889	3.99	8.73	4.05	16.49	18.10	4.10	12.04	16.14	25.19	3.54	0.62	0.01
1890	4.63	10.81	4.19	18.28	20.19	3.46	8.01	11.47	24.26	3.24	0.68	1.02
1891	5.17	13.01	4.74	18.45	20 89	3.48	8.34	11.82	27.38	0.87	0.86	0.17
1892	5.08	10.86	4.49	18.23	19.86	4.45	8.45	12.90	23.35	0.45	0.78	0.86
1893	6.01	11.14	4.86	18.85	21.12	3.93	7.78	11.71	26.06	0.53	0.73	0.70
1894	5.20	9.05	4.88	16.74	19.10	4.32	6.43	10.74	27.07	0.49	0.55	0.39
1895	5.13	8.29	4.99	15.91	18.02	1.62	10.39	12.01	21.70	0.47	0.67	1.21
1896	5.73	8.16	5.14	16.24	18.68	0.99	6.70	7.62	20.69	0.48	0.51	0.12
*Average	4.93	10.02	4.58	17.55	19.64	3.71	9.20	12.91	24.79	1.78	0.74	0.45
1897	6.28	6.88	4.98	14.64	17.26	0.48	4.71	5.19	16.53	0.46	0.48	0.10
1898	6.75	6.39	5.08	15.52	18.17	0.37	3.99	4.37	14.28	0.40	0.31	1.80
1899	7.26	6.23	5.47	15.47	17.89	0.46	5.18	5.64	15.48	0.40	0.49	1.91
1900	6.57	6.51	5.62	15.30	17.39	0.25	4.69	4.95	13.06	0.34	0.34	0.94
1901	5.78	4.93	5.71	14.20	16.36	0.11	2.82	2.94	12.63	0.50	0.43	1.14
1902	6.93	5 39	5.92	14.08	16.41	0.17	3.28	3.45	12.36	0.49	0.55	0.65
1903	8.09	5.36	5.69	15.31	18.02	0.12	3.28	3.40	11.84	0.36	0.41	0.89
1904	9.56	4.33	5.82	16.20	18.34	0.07	2.04	2.12	11.08	0.29	0.41	0.59
1905	10.13	4.26	5.98	16.09	18.46	0.04	2.14	2.18	12.91	0.35	0.41	0.77
1906	10.38	3.54	6.48	15.73	18.72	0.03	2.67	2.70	13.26	0.49	0.41	0.58
*Average	7.77	5.38	5.68	15.25	17.70	0.21	3.48	3.69	13.34	0.41	0.42	0.94
Average 1857–1906.	3.91 (44 yrs)	5.34	3.44	18.55	21.69	5.38	7.00	12.38	28.34	4.10	0.80	0.32 (44 yrs.)

*Of the Decade. †4 Years.

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CONDENSED CHRONOLOGICAL SUMMARY OF IMPORTANT CAUSES OF DEATH.

Deaths per 10 000 of population — Average rates by decades — Average rate for fifty year period, 1857-1906.

YEARS.	Heart Diseases.	Heart and Circulatory Diseases.	Malaria.	Measles.	Nervous Diseases.	Pneumonia.	Puerperal Fever.	Scarlet Fever.	Smallpox.	Typhoid Fever.	Violence.	Whooping Cough.
1857.....	1.37	6.16	5.37	4.45	9.47	5.71	3.77	8.56	1.14	9.36	10.39	2.28
1858.....	1.78	6.00	1.78	2.44	10.00	8.56	5.22	25.89	0.56	5.44	10.44	2.11
1859.....	1.83	5.27	1.08	1.08	11.29	5.70	3.55	27.20	.....	5.48	11.18	1.29
1860.....	2.01	5.31	2.01	1.37	13.64	4.40	0.92	11.45	0.27	4.21	10.71	2.20
1861.....	2.67	5.75	1.25	2.17	11.42	4.58	0.25	3.75	0.42	6.17	8.50	2.00
1862.....	1.88	5.14	1.37	2.75	11.65	6.37	0.72	24.24	0.36	6.15	6.08	1.95
1863.....	2.13	5.13	1.80	1.87	14.80	8.40	0.67	27.00	7.67	9.93	11.27	6.07
1864.....	3.07	7.32	1.89	7.97	19.19	9.62	1.54	4.13	16.71	11.34	9.39	1.12
1865.....	2.18	5.99	2.41	1.12	25.83	8.40	0.56	4.99	3.19	10.64	8.91	0.84
1866.....	3.04	6.53	3.69	8.28	26.34	9.33	0.90	6.34	0.45	10.13	10.83	9.18
*Average....	2.20	5.86	2.27	3.35	15.36	7.11	1.81	14.36	3.08	7.89	9.77	2.90
1867.....	2.89	6.22	1.73	3.91	25.82	7.60	1.29	4.49	5.47	7.33	8.71	2.76
1868.....	4.80	9.44	1.15	4.25	34.75	13.53	1.55	7.22	5.79	7.93	8.93	2.50
1869.....	4.64	8.96	1.14	3.89	31.07	11.18	2.14	20.46	0.61	6.54	9.89	4.68
1870.....	4.57	9.75	1.60	3.10	34.28	10.24	1.79	9.95	0.49	8.74	9.49	2.97
1871.....	3.98	7.78	1.05	4.67	28.24	11.55	2.03	3.71	2.18	6.10	11.70	1.88
1872.....	4.60	9.42	1.55	1.01	48.29	12.57	3.57	3.48	17.83	14.26	11.16	3.38
1873.....	4.71	10.50	1.66	2.76	42.53	11.45	3.50	3.03	13.61	7.16	10.13	4.08
1874.....	4.78	9.28	0.78	0.38	35.18	9.53	1.62	2.66	2.28	5.34	8.60	2.71
1875.....	5.32	9.96	1.12	2.92	33.01	12.31	1.42	5.14	0.25	5.17	7.52	2.65
1876.....	4.64	9.54	1.52	0.37	33.95	8.93	1.20	19.89	0.71	4.12	7.09	3.26
*Average....	4.49	9.09	1.33	2.73	34.71	10.89	2.01	8.00	4.92	7.27	9.32	3.09
1877.....	4.26	8.16	0.47	1.37	29.63	8.02	1.00	19.05	1.00	3.70	6.37	1.21
1878.....	6.92	10.37	1.35	0.82	24.87	8.63	1.33	3.05	0.48	3.34	7.97	5.38
1879.....	7.20	10.86	1.00	1.04	24.09	9.36	1.20	7.91	0.02	4.23	7.30	0.67
1880.....	6.02	10.97	1.41	2.56	27.01	12.58	1.37	6.74	0.85	3.40	9.52	1.35
1881.....	6.20	11.07	2.30	2.04	31.81	13.09	2.67	3.46	21.85	10.52	10.14	2.91
1882.....	6.67	11.93	1.59	4.35	27.31	14.79	1.91	3.57	23.04	8.24	10.26	1.80
1883.....	7.26	12.71	1.64	0.76	24.71	11.97	2.62	6.90	0.79	6.22	9.45	1.59
1884.....	6.16	11.29	1.56	5.06	24.16	11.32	1.71	5.62	0.03	5.62	9.22	1.78
1885.....	6.92	11.70	1.67	1.14	22.17	11.07	1.61	4.11	0.12	7.46	8.87	1.41
1886.....	6.44	11.18	1.68	1.79	24.04	12.51	1.79	3.13	0.03	6.86	11.52	1.59
*Average....	6.41	11.02	1.47	2.09	25 98	11.33	1.72	6.35	4.82	5.96	9.06	1.97
1887.....	7.22	12.28	1.14	4.49	24.05	13.26	1.96	2.50	0.03	5.03	12.68	1.37
1888.....	7.71	12.87	1.20	1.88	23.43	13.77	2.32	2.29	.....	4.67	11.05	2.28
1889.....	7.10	11.87	1.12	2.18	21.95	12.50	1.47	1.98	0.02	4.84	10.44	1.03
1890.....	7.42	12.69	1.10	0.61	21.14	18.85	1.51	1.75	.....	9.16	13.04	1.83
1891.....	8.09	13.83	1.24	2.31	26.84	25.18	1.53	4.34	.....	17.38	12.88	1.69
1892.....	8.82	14.44	1.16	1.54	24.35	19.98	1.45	3.18	0.02	12.41	13.84	1.37
1893.....	8.83	14.56	0.66	1.87	22 59	19.61	1.44	2.63	0.18	5.35	15.17	1.68
1894.....	7.93	12.69	0.26	1.39	18.16	11.61	1.62	1.45	7.89	3.75	11.84	1.60
1895.....	9.98	14 86	0.41	1.14	17.86	17.26	1.02	0.56	1.15	3.79	10.83	0.89
1896.....	9.03	13.87	0.22	0.51	15.36	15.00	1.02	0.38	.....	5.26	10.87	1.31
*Average....	8.21	13.40	0.85	1.79	21.57	16.70	1.53	2.11	0.93	7.16	12.26	1.51
1897.....	9.16	14.22	0.16	0.93	13.29	14.43	0.96	0.54	0.01	2.93	9.97	1.07
1898.....	8.98	13.68	0.17	0.35	13.88	15.91	0.73	0.43	.....	4.08	9.74	1.34
1899.....	9.17	13.79	0.15	1 03	12.76	21.14	0.88	3.28	0.01	2.72	9.75	0.47
1900.....	11.14	15.83	0.17	1.14	11.45	19.95	0.59	1.33	0.01	1.98	9.73	1.68
1901.....	11.08	15.70	0.13	0.90	10.88	17.80	0.64	0.94	0.02	2.90	9.96	1.18
1902.....	11.56	16.38	0.12	0.68	10.71	18.91	0.59	2.45	0.03	4.41	10.41	1.47
1903.....	11 16	15.96	0.11	1.47	10.53	24.70	0.56	1.58	0.25	3.14	13.81	1.44
1904.....	10.57	15.83	0.03	0.24	8.47	21.39	0.68	0.74	0.15	1.93	10.42	0.58
1905.....	10.60	15.70	0.08	1.16	8.08	17.99	0.71	0.40	0.31	1.61	10.58	1.80
1906.....	10.71	15.71	0.04	0.62	8.03	19.75	0.65	2.41	.....	1.81	10.88	0.81
*Average...	10.41	15.28	0.12	0.85	10.81	19.20	0.70	1.41	0.08	2.75	10.52	1.18
Average..... 1857-1906...	6.34	10.92	1.21	2.16	21.68	13.05	1.56	6.45	2.77	6.21	10.17	2.13

*Of the Decade.

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CONDENSED CHRONOLOGICAL SUMMARY OF MORTALITY FROM ALL CAUSES AND OF CHILDREN UNDER FIVE YEARS OF AGE.

Deaths per 1000 of population — Average rates and totals by decades — Average rates for the fifty years, 1857-1906.

YEARS.	ALL CAUSES, ALL AGES.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS BETWEEN ONE AND FIVE YEARS OF AGE.		DEATHS UNDER FIVE YEARS OF AGE.	
	Total Deaths.	Death rates per 1000 of Population.	Total Deaths.	Per 1000 of the total Population.	Total Deaths.	Per 1000 of the total Population.	Total Deaths.	Per 1000 of the total Population.
1857	2414	27.56	.....	.....	.....	.....	1270	14.50
1858	2255	25.06	.....	.....	.....	.....	1253	13.92
1859	2008	21.59	.....	.....	.....	.....	1040	11.18
1860	2264	20.73	.....	.....	.....	.....	1158	10.60
1861	2279	18.99	.....	.....	.....	.....	1136	9.47
1862	2835	20.52	.....	.....	.....	.....	1418	10.26
1863	3875	25.83	.....	.....	.....	.....	1788	11.92
1864	4448	26.26	.....	.....	.....	.....	2081	12.29
1865	4029	22.57	.....	.....	.....	.....	1932	10.82
1866	6524	32.55	.....	.....	.....	.....	2899	14.46
*Average	3293	24.17	†.....	†.....	†.....	†.....	1598	11.94
1867	4773	21.21	.....	.....	.....	.....	2498	11.10
1868	5984	23.74	2530	10.04	1183	4.69	3713	14.73
1869	6488	23.17	2251	8.04	1836	6.56	4077	14.56
1870	7323	22.88	2709	8.84	1891	6.17	4600	15.00
1871	6976	20.87	2475	7.40	2460	7.36	4024	12.04
1872	10156	27.64	3451	9.39	1149	3.13	5911	16 09
1873	9557	25.15	3570	9.39	2106	5.54	5706	15.02
1874	8025	20.30	3308	8.37	1588	4.02	4896	12 38
1875	7899	19.72	3024	7.55	1712	4.27	4736	11 82
1876	8573	21.03	2694	6.61	2197	5.39	4891	12.00
*Average	7575	22.67	2890	8.40	1791	5.24	4505	13.47
1877	8026	18.67	2432	5.66	2080	4.84	4512	10.46
1878	7422	16.99	2465	5.64	1552	3.55	4027	9.22
1879	8614	17.53	2549	5.19	1895	3.86	4444	9 04
1880	10462	20.79	3147	6.25	2492	4.95	5639	11.21
1881	14101	26.11	4374	8.10	2975	5.51	7349	13.61
1882	13234	23.60	4059	7.24	2496	4.44	6655	11.87
1883	11555	19.92	3850	6.64	2023	3.49	5875	10.13
1884	12471	19 80	4179	6.63	2489	3.96	6668	10.59
1885	12474	18.76	4000	6.02	2187	3.29	6187	9.30
1886	13699	19.47	4081	5.80	2682	3.81	6763	9.61
*Average	11206	20.16	3514	6.32	2287	4.17	5812	10.50
1887	15409	20.27	4483	5.90	3085	4.06	7568	9.96
1888	15772	19.65	4718	5.88	2815	3.51	7533	9.39
1889	16946	18.12	5008	5.36	3196	3.42	8204	8.77
1890	21856	19.87	6630	6.03	3254	2.96	9884	8.99
1891	27754	24.16	8008	6.97	4593	4.00	12801	11.14
1892	26219	21.85	7514	6.26	4148	3.46	11662	9.72
1893	27083	21.61	8125	6.48	4238	3.38	12363	9.87
1894	23892	18.26	7336	5.61	3681	2.81	11016	8.42
1895	24219	17.72	6817	4.99	3635	2.66	10452	7.65
1896	23257	16.29	6512	4.56	3201	2.24	9713	6.80
*Average	22241	19.78	6515	5.80	3585	3.25	10120	9.07
1897	21809	14.63	5735	3.85	2811	1.89	8546	5.73
1898	22793	14.64	5415	3.48	2720	1.75	8135	5.24
	25503	15 68	5520	3.39	3360	2.07	8880	5.46
	941	14.68	5341	3.14	2942	1.73	8283	4.88
	06	13.89	5044	2.87	2444	1.39	7488	4.26
	55	14.57	5144	2.83	2883	1.59	8027	4.42
	14	15.43	5316	2.84	2961	1.58	8277	4.42
	11	13 62	5025	2.60	2027	1.05	7072	3.66
	12	13.67	5831	2.93	2683	1.35	8512	4 28
	18	14.18	6114	2.98	2678	1.31	8792	4.29
	39	14.50	5449	3.09	2751	1.57	8201	4.66
	011	20.26	4635	5.84 (39 years)	2624	3.51 (39 years)	6047	9.93

† No records prior to 1868.

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Population of Chicago

The population of Chicago is estimated for the intercensal years by the method recommended by the United States Census Office.

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POPULATION OF CHICAGO.

FOREIGN BORN BY COUNTRY OF BIRTH.

U. S. Census Bureau Enumerations of 1900 and 1890.

	1900	1890
NORTH AND SOUTH AMERICA.		
Canada and Newfoundland	24 779	24 297
Mexico	102	64
Central America	141	17
South America	121	78
Cuba and West Indies	226	167
GREAT BRITAIN AND IRELAND.		
England	29 206	28 237
Scotland	10 347	9 217
Wales	1 818	1 613
Ireland	73 912	70 028
Gt. Britain (*not specified*)	.....	17
GERMANIC NATIONS.		
Germany	* 170 738	161 089
Austria	† 11 815	6 043
Holland	18 555	5 420
Belgium	1 160	801
Luxemburg	334	103
Switzerland	3 251	2 262
SCANDINAVIAN NATIONS.		
Norway	22 011	21 835
Sweden	48 836	43 082
Denmark	10 166	7 087
SLAV NATIONS.		
Russia	‡ 24 594	7 688
Hungary	4 946	1 818
Bohemia	36 362	25 185
Poland	§ 59 713	24 026
Roumania	287	.....
LATIN NATIONS.		
France	2 989	2 562
Italy	16 008	5 668
Spain	126	120
Portugal	21	37
Greece	1 498	245
ASIATIC NATIONS.		
China	1 179	594
Japan	80	7
India	97	70
Asia (*not specified*)	989	117
ALL OTHER.		
Africa	90	33
Atlantic Islands	86	19
Australia	273	208
Europe (*not specified*)	115	688
Pacific Islands	46	33
Turkey	180	25
Other Countries	91	44
Born at Sea	315	161

* Excluding German Poland (see Poland).

† Excluding Austrian Poland (see Poland).

‡ Including Finland, excluding Russian Poland (see Poland).

§ Including Austrian Poland, 9 499; German Poland, 32 995; Russian Poland, 15 026; Poland, unspecified, 2 193.

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POPULATION OF CHICAGO.

BY AGE GROUPS—1890 TO 1906.

U. S. Census Bureau Enumerations in 1890 and 1900.
Totals Estimated for Inter-Censal years by method recommended by U. S. Census Office.

YEARS.	Under 1 Year.	1 to 5 Years.	5 to 10 Years.	10 to 20 Years.	20 to 30 Years.	30 to 40 Years.	40 to 50 Years.	50 to 60 Years.	Over 60 Years.	Unstated Ages.	Total All Ages.
1890	30 104	110 679	116 646	198 296	251 771	196 909	112 445	49 176	30 596	3 228	1 099 850
1891	31 132	113 963	122 347	207 128	259 972	205 979	118 326	52 959	33 660	3 329	1 148 795
1892	32 033	117 162	128 251	216 431	268 380	215 591	124 532	56 987	36 832	3 531	1 199 730
1893	32 954	121 164	134 450	226 045	276 793	225 419	131 066	61 273	40 222	3 636	1 253 022
1894	33 895	124 940	140 945	236 086	285 554	235 824	137 935	65 827	43 841	3 835	1 308 682
1895	34 854	128 849	147 752	246 710	294 412	246 710	145 156	70 664	47 702	4 004	1 366 813
1896	35 831	132 888	154 887	257 669	303 492	258 097	152 745	75 944	51 819	4 155	1 427 527
1897	36 677	137 207	162 363	269 263	312 799	269 860	160 723	81 550	56 208	4 237	1 490 937
1898	37 528	141 682	170 198	281 380	322 177	282 002	169 108	87 513	60 886	4 690	1 557 164
1899	38 544	146 154	178 571	294 041	331 447	295 179	178 246	93 514	65 886	4 751	1 626 333
1900	39 375	150 980	187 395	307 210	340 886	308 548	187 260	100 427	71 480	5 014	1 698 575
1901	40 060	154 090	194 501	318 019	348 766	319 776	195 028	105 948	75 551	5 271	1 757 010
1902	40 666	157 036	201 696	328 596	356 372	330 956	202 967	111 831	79 880	5 445	1 815 445
1903	41 038	160 029	208 938	339 360	363 720	342 170	210 999	117 690	84 325	5 621	1 873 890
1904	41 545	162 701	216 226	349 942	371 198	353 420	219 125	123 475	88 886	5 797	1 932 315
1905	42 005	165 232	223 561	360 724	378 442	364 705	227 344	129 598	93 167	5 972	1 990 750
1906	42 418	167 623	230 943	371 517	385 452	376 025	235 656	136 066	97 336	6 149	2 049 185

POPULATION OF CHICAGO BY SEX, COLOR AND GENERAL NATIVITY.

U. S. Census Bureau Enumerations, 1890 and 1900.

BY SEX.	1900	1890	BY COLOR.	1900	1890	BY NATIVITY.	1900	1890	Per cent Increase.
Males	863 408	568 402	White	1 667 140	1 084 998	Native	1 111 463	649 184	71.2
Females	835 167	531 448	Negro	30 159	14 271	Foreign	587 112	450 666	30.1
			Other	1 285	581				

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Meteorologic Data
Chicago

1871-1906

Henry J. Cox,
Professor U. S. Weather Bureau.

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MONTHLY AND ANNUAL MEAN TEMPERATURES: 1872–1906.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1872	....	....	....	....	....	....	72	71	64	50	32	18	....
1873	20	24	33	43	52	68	69	71	63	50	34	32	46
1874	28	30	36	39	58	70	75	73	67	54	40	33	50
1875	16	15	31	43	54	63	69	68	61	48	37	36	45
1876	33	32	34	47	59	68	74	74	62	49	40	19	49
1877	22	37	29	47	57	67	74	72	67	56	40	43	51
1878	32	36	45	52	55	65	75	74	66	53	44	24	52
1879	21	27	41	47	58	64	76	72	61	61	42	31	50
1880	40	35	38	49	65	71	73	73	63	51	32	24	51
1881	19	25	32	42	61	63	73	75	70	56	40	38	50
1882	29	30	40	46	51	64	69	71	65	58	43	27	50
1883	16	23	32	47	53	64	71	68	61	52	42	31	47
1884	19	28	34	44	56	64	69	68	69	56	41	30	48
1885	19	18	31	46	53	65	73	68	64	52	43	32	47
1886	22	29	37	50	57	66	72	73	66	57	38	25	49
1887	16	26	32	49	60	67	75	69	62	47	36	27	47
1888	15	23	30	46	53	67	73	69	60	49	42	32	46
1889	29	20	38	47	57	62	70	71	63	49	39	41	49
1890	31	32	30	46	53	70	72	68	60	51	42	31	49
1891	30	29	31	47	53	66	67	69	69	53	34	35	48
1892	20	30	31	44	52	64	73	71	64	54	35	23	47
1893	12	22	33	44	52	68	74	70	64	53	36	25	46
1894	28	23	41	47	56	71	73	71	66	52	34	32	50
1895	18	17	32	46	59	70	70	72	69	46	36	30	47
1896	27	27	31	53	66	67	72	73	61	50	38	33	50
1897	22	29	35	46	55	65	74	69	70	58	39	25	49
1898	29	28	40	44	56	69	73	71	68	51	37	24	49
1899	23	18	30	50	59	70	72	74	63	58	45	27	49
1900	29	20	29	47	58	64	72	76	66	61	38	30	49
1901	26	17	34	45	54	69	77	72	64	55	38	24	48
1902	25	21	39	46	59	64	72	68	61	55	47	26	49
1903	24	25	40	47	60	61	72	68	64	54	36	20	48
1904	18	17	35	41	57	64	71	68	64	53	43	27	47
1905	18	17	39	46	56	65	71	74	68	53	41	32	48
1906	33	28	30	51	60	68	72	76	70	53	42	33	51
Means	23.7	25.4	34.3	46.3	56.7	66.4	72.2	71.1	64.4	53.1	39.0	29.2	48.5

TEMPERATURE EXTREMES.

MONTH.	Maximum.	Year.	Day.	Minimum.	Year.	Day.	Highest Monthly Mean.	Year.	Lowest Monthly Mean.	Year.
January	65	1876	1	—20	1897;	25	39.8	1880	12.0	1893
February	63	1880*	26	—21	1899	9	39.0	1882	14.6	1875
March	80	1896	29	—12	1873	4	45.2	1878	28.9	1877
April	88	1899	29	17	1875§	17	53.4	1896	38.8	1874
May	94	1895	31	27	1875	2	65.5	1896	52.1	1873
June	98	1872	19	40	1894‡	6	71.4	1894	61.2	1903
July	103	1901	21	50	1873°	19	77.4	1901	67.0	1891
August	98	1874†	11	48	1894	3	76.3	1900	67.6	1890
September	98	1899	5	32	1899	30	70.2	1881	59.8	1888
October	87	1897	15	14	1887	25	61.4	1900	46.2	1895
November	75	1888	1	— 2	1872	29	47.0	1902	31.6	1880
December	68	1875	31	—23	1872	24	43.4	1877	18.4	1872

* Also in 1876, 10th day. † Also in 1881, 4th day; 1887, 10th day; 1896, 8th day. ‡ Also in 1875, 9th day. § Also in 1881, 1st day; 1879, 3d day. ° Also in 1895, 9th day. ‡ Also in 1875, 22d day. j Also in 1872.

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MONTHLY AND ANNUAL PRECIPITATION: 1871–1906.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	ANNUAL.
1871....	4.13	1.45	2.66	3.70	3.90	5.56	2.52	2.01	0.74	1.88	3.62	3.44	35.61
1872....	0.68	0.84	3.79	3.03	3.24	3.45	3.09	2.59	6.43	0.65	1.06	0.22	29.07
1873....	2.56	0.47	0.89	6.22	7.20	1.44	4.04	1.58	3.53	2.43	1.61	4.44	36.41
1874....	3.47	1.51	2.15	2.67	2.08	3.25	0.58	3.15	3.76	2.55	2.83	0.63	28.63
1875....	0.96	1.99	1.43	2.32	3.64	5.17	7.18	3.29	4.39	4.32	0.75	2.62	38.06
1876....	3.22	3.90	4.04	2.07	1.85	5.96	3.11	3.66	3.74	1.20	3.25	0.48	36.48
1877....	1.91	0.06	5.37	2.42	1.81	6.04	2.98	3.06	2.02	6.51	6.08	2.75	41.01
1878....	1.31	2.12	4.39	5.57	5.22	3.02	6.09	3.66	1.99	5.17	0.83	2.58	41.95
1879....	0.54	1.47	2.37	1.93	3.89	3.18	5.58	0.45	1.18	2.72	4.93	2.47	30.71
1880....	3.53	2.91	2.25	5.20	4.97	3.50	3.07	4.47	2.25	3.19	0.87	1.11	37.32
1881....	0.87	5.98	2.99	1.84	1.85	5.93	4.31	0.54	4.34	6.89	5.97	2.67	44.18
1882....	1.55	2.24	3.43	6.72	5.52	5.71	3.43	4.96	0.91	3.40	1.48	1.99	41.34
1883....	1.74	4.74	0.42	3.72	7.32	5.61	5.53	1.21	1.36	7.36	5.26	1.59	45.86
1884....	1.39	3.27	5.16	3.06	1.53	2.11	3.71	2.50	2.29	3.59	1.80	4.21	34.61
1885....	3.18	2.01	0.57	4.00	3.17	5.20	2.44	11.28	2.97	3.87	2.33	3.35	44.37
1886....	3.56	1.51	1.79	1.29	1.00	0.94	1.53	3.38	6.93	1.42	1.66	1.76	26.77
1887....	3.13	5.10	0.89	0.46	1.38	1.63	1.05	3.35	4.03	2.03	2.41	3.67	29.13
1888....	1.56	1.51	2.99	2.13	6.22	1.66	3.93	2.10	0.98	2.95	2.89	1.94	30.86
1889....	1.64	1.31	1.43	2.35	5.38	2.93	9.56	0.39	2.75	1.82	3.49	1.90	34.96
1890....	2.98	2.42	2.10	3.23	5.13	3.25	2.57	2.58	1.39	4.20	1.59	1.25	32.69
1891....	1.99	1.95	2.13	3.14	2.09	2.42	2.47	4.52	0.32	0.36	3.83	1.32	26.54
1892....	1.99	1.57	2.21	2.17	6.77	10.58	2.23	1.85	1.34	1.54	2.68	1.63	36.56
1893....	2.08	2.44	1.69	4.16	1.93	3.59	3.08	0.18	1.98	1.75	2.45	2.14	27.47
1894....	1.55	2.13	2.66	2.65	3.35	1.96	0.60	0.60	8.28	0.84	1.18	1.66	27.46
1895....	2.15	1.60	1.32	0.86	1.99	1.79	2.42	6.49	0.89	0.51	5.60	6.76	32.38
1896....	1.12	3.48	1.26	2.79	4.16	2.82	3.61	3.52	6.70	1.36	2.16	0.16	33.14
1897....	4.53	2.22	3.56	2.23	0.84	3.60	1.47	1.70	0.84	0.18	3.06	1.62	25.85
1898....	3.54	2.59	4.60	0.76	2.23	5.30	1.94	3.03	3.16	3.26	2.25	1.11	33.77
1899....	0.58	1.60	2.11	0.14	4.35	2.71	6.66	0.91	2.39	2.09	1.14	1.81	26.49
1900....	1.21	3.52	1.58	1.02	3.59	2.06	4.64	4.24	1.56	1.35	3.30	0.58	28.65
1901....	1.15	2.05	3.38	0.33	2.18	2.42	4.25	2.00	2.92	1.29	0.85	1.70	24.52
1902....	0.66	1.53	4.16	2.26	5.08	6.45	5.78	1.44	4.83	1.45	2.03	1.90	37.57
1903....	1.09	3.03	1.67	3.77	0.93	1.62	4.78	3.49	4.00	1.09	0.34	2.28	28.09
1904....	2.25	1.71	4.57	3.01	1.54	0.55	2.76	4.00	2.65	1.58	0.31	1.21	26.14
1905....	1.33	1.95	2.43	3.03	5.14	3.27	5.02	4.46	4.18	1.82	2.05	0.68	35.36
1906....	1.67	2.37	1.61	1.86	2.09	1.87	4.84	1.43	5.54	2.05	3.08	2.46	30.87
Means.	2.02	2.29	2.56	2.72	3.46	3.57	3.69	2.89	3.04	2.52	2.51	2.06	33.3

EXTREMES OF PRECIPITATION AND WIND.

MONTH.	PRECIPITATION.							WIND.			
	24 hour max.	Year.	Day.	Greatest mo.	Year.	Least mo.	Year.	Max. vel.	Dir.	Year.	Day.
January	1.53	1876	18	4 53	1897	0 54	1879	66	ne.	1898	22
February	1.94	1876*	8–9	5.98	1881	0.06	1877	84	ne.	1894	12
March	3.26	1884	25–26	5.37	1877	0.42	1883	68	ne.	1890	27
April	2.41	1871	10	6.72	1882	0.14	1899	72	ne.	1893	20
May	2.82	1873	1-2	7.32	1883	0.84	1897	72	sw.	1903	25
June	3.44	1885	2–3	10.58	1892	0.55	1904	72	nw.	1892	13
July	4.14	1878	25–26	9.56	1889	0.58	1874	72	w.	1897	5
August	6.19	1885	2–3	11.28	1885	0.18	1893	72	sw.	1898	16
September	3.44	1875	9	8.28	1894	0.32	1891	72	sw.	1900	11
October	2.55	1877	19–20	7.36	1883	0.18	1897	63	se.	1898	17
November	3.39	1883	5–6	6.08	1877	0.31	1904	76	s.	1898	7
December	2.56	1895	18–19	6.76	1895	0.16	1896	72	sw.	1904	27

*Also in 1883, 16th day.

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ANNUAL SUMMARY OF METEOROLOGIC DATA FOR CHICAGO: 1906.

HENRY J. COX, PROFESSOR, U. S. WEATHER BUREAU.

MONTH.	TEMPERATURE.							MOISTURE.					Percentage of Sunshine.	Average Cloudiness.	WIND.					NUMBER OF DAYS.												
	MEAN.			EXTREMES.				Relative Humidity.	PRECIPITATION.						Average Hourly Velocity.	Prevailing Direction.	MAXIMUM.			Gales.	Clear.	Partly Cloudy.	Cloudy.	Precipitation.	Thunderstorms.	Fog.	Snow.	Hail.	Auroras.	MAXIMUM TEMPERATURE.		Minimum Temperatur Below 32°
	Maximum.	Minimum.	Monthly.	Maximum.	Date.	Minimum.	Date.		Total.	Maximum in 24 hours.	Date.	Snowfall.					Velocity.	Direction.	Date.										Below 32°	Above 90°	
	°	°	°	°		°		%	In.	In.		In.	%	a			b			c				d	e	f					
January...	39	26	33	63	20	11	9	82	1.67	0.73	20-21	2.9	35	6.6	18	sw	56	sw	3	5	8	6	17	11	2	1	7	0	0	4	0	26
February .	34	21	28	54	20	6	2	80	2.37	0.75	24	5.9	58	5.8	16	s	54	sw	3	3	7	12	9	12	2	1	10	0	0	11	0	20
March.....	35	25	30	56	26	10	22	79	1.61	0.36	26-27	9.0	41	6.8	17	ne	49	nw	21	3	6	8	17	15	0	2	12	0	0	14	0	21
April	58	43	51	80	25	34	1	76	1.86	0.58	8-9	0	70	4.8	14	sw	40	s	13	2	10	13	7	9	3	0	0	1	0	0	0	0
May	68	51	60	90	17	36	9	72	2.09	1.26	1-2	0	74	5.2	15	sw	48	sw	12	5	9	14	8	8	3	0	0	0	0	0	0	0
June	75	61	68	93	28	51	11	72	1.87	0.50	29-30	0	72	4.8	14	sw	56	nw	29	3	11	12	7	13	7	0	0	1	0	0	3	0
July	77	66	72	92	22	59	3	72	4.84	2.91	28	0	75	4.4	11	n	42	nw	28	1	14	12	5	7	4	0	0	0	0	0	1	0
August	82	70	76	92	22	56	27	76	1.43	0.38	4	0	65	4.9	11	sw	41	w	9	1	11	13	7	9	7	0	0	0	0	0	4	0
September	76	64	70	89	11	55	30	74	5.54	2.73	28-29	0	68	4.3	13	se	46	n	29	3	14	8	8	7	4	0	0	0	0	0	0	0
October ...	59	47	53	75	8	27	11	75	2.05	0.77	18	T.	45	6.4	16	nw	50	nw	27	3	5	11	15	7	0	0	2	0	0	0	0	2
November	47	36	42	64	5	25	24	76	3.08	1.52	20-21	2.8	39	6.7	14	w	59	sw	21	3	4	11	15	13	0	1	5	0	0	0	0	8
December.	38	27	33	56	14	10	7	83	2.46	1.14	5-6	0.3	30	7.7	15	nw	39	sw	31	0	3	8	20	11	0	3	2	0	0	6	0	24
Year	57.3	44.8	51.1	93	June 28	6	Feb 2	76	30.87	2.91	July 28	20.9	56.0	5.7	14.5	sw	59	sw	Nov. 21	32	102	128	135	122	32	8	38	2	0	35	8	101

NOTES.—*a*, Tenths of clouded sky. *b*, For five minutes. *c*, 40 miles velocity or over. *d*, .01 inch or over. *e*, For one hour or more. *f*, 0.1 inch or over.

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MISCELLANEOUS METEOROLOGIC DATA FOR 1906.

BAROMETRIC PRESSURE; SEA LEVEL.

Mean: 30.06 inches. Highest: 30.72 inches, March 23d. Lowest: 29.03 inches, January 3d.

AVERAGE BAROMETRIC READINGS.
STATION ELEVATION 823 FEET.

January ...29.127	May.....29.092	September.29.185
February..29.325	June.....29.030	October....29.137
March.....29.208	July 29.104	November.29.244
April 29.151	August 29.117	December.29.244

Dates to July 1st of—

Greatest depth of snow on ground, and amount: March 19th, 3.6 inches.

Greatest snowfall in 24 hours, and amount: March 19th, 3.4 inches.

Last occurrence of zero temperature: did not occur.

Last killing frost: March 31st.

Last light frost: May 10th.

First thunderstorm: January 15th.

After July 1st—

Last thunderstorm: September 21st.

First light frost: October 1st.

First killing frost: October 10th.

First occurrence of zero temperature: did not occur.

Greatest depth of snow on ground, and amount: November 12th, 1.2 inches.

Greatest snowfall in 24 hours, and amount: November 12th, 1.4 inches.

Longest period without precipitation: 11 days, from July 3d to July 13th inclusive.

Longest period with precipitation: 6 days, from March 11th to March 16th; November 16th to November 21st, inclusive.

Only three months of the year 1906 were below their average temperatures, and two of these—July and October—varied less than one degree. As compared with their normals, January was the warmest month, with a mean temperature of 8.9 degrees above its normal; March, the coldest, its mean temperature being 4.1 degrees below its normal. Zero temperature did not occur in 1906. No previous calendar year has such a record. The year as a whole was 2.5 degrees warmer than the average.

The precipitation, 30.87 inches, was below normal, the deficiency for the year being 2.49 inches. Much less snow than usual fell, the amount for the year (20.9 inches) lacking 14.2 inches of the average. Not so many rainy days occurred as is usual, yet there were 121, only four less than the average. There were 36 days on which snow fell, four more than the average number, but the snowfall of each storm was generally less than usual, as would be expected from the deficiency of total depth of snowfall.

The amount of sunshine for the year was only 2 per cent. below the normal. The spring and early summer were the sunniest, averaging 7 per cent. above the normal, while the last three months of the year were the cloudiest, averaging 10 per cent. below the normal.

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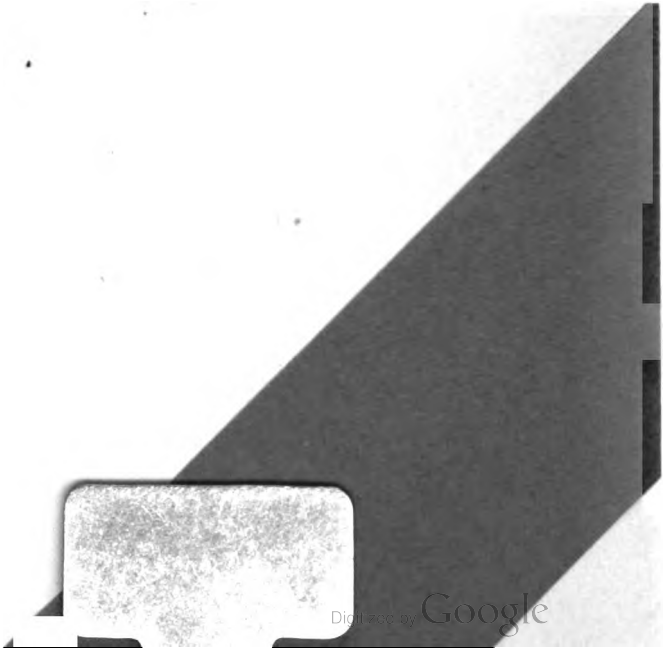
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